

*Draft*

**OTAY RIVER WATERSHED  
PROTECTION, ENHANCEMENT,  
RESTORATION, AND MANAGEMENT  
STRATEGIES REPORT**

*Prepared for:*

**The County of San Diego  
Department of Planning and Land Use  
5201 Ruffin Road, Suite B  
San Diego, California 92123-1666**

*Prepared by:*

**Aspen Environmental Group  
Contract No. 46618**

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## A. INTRODUCTION

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### A.1 PURPOSE OF THE STRATEGIES

This document presents strategies intended to protect, enhance, restore, and manage beneficial uses and resources in the Otay River watershed now and in the future. It provides key considerations for advancing sixteen different approaches that would achieve this purpose and meet particular Otay River Watershed Management Plan goals, objectives, and actions, which are described in Section A.2.

The Otay River watershed is an approximately 145-mi<sup>2</sup> watershed (92,920 acres) located in southern San Diego County, near the international border with Mexico (Figure 1; note: all figures are in Section E). This watershed includes unincorporated County land, as well as land within the jurisdictions of the Cities of Chula Vista, San Diego, Imperial Beach, Coronado, and National City (Figures 2 and 3). As with other coastal watersheds in southern California, the landscape along the coastal plain in proximity to the watershed's outlet has rapidly developed, with scattered, lower-density development occurring within the mountainous inland areas. Urbanization and other landscape uses are anticipated to continue, with the population and housing expected to nearly double in the next 25 years (SANDAG, 2004), as are efforts to protect, enhance, and restore the remaining upland and aquatic resources within this watershed. Large-scale conservation programs such as the Multiple Species Conservation Program (MSCP), the Otay Valley Regional Park (OVRP), and the San Diego Bay National Wildlife Refuge (NWR) are conserving significant natural resources in this watershed while allowing other uses to occur. While these efforts have been extremely valuable, none has attempted to evaluate and consider strategies for protecting, enhancing, restoring, and managing the watershed's natural resources and the various uses comprehensively at the watershed scale. To address this need, on March 24, 2004, the County of San Diego, City of Chula Vista, City of Imperial Beach, and the Unified Port of San Diego entered into a Joint Exercise of Powers Agreement (JEPA) to develop and adopt the Otay River Watershed Management Plan (ORWMP). The City of San Diego recently entered into this JEPA as well. This plan is intended to identify and protect, enhance, restore, and manage the watershed's beneficial uses, such as water quality and wildlife habitat, while allowing for continued reasonable economic development and other uses, such as recreation.

The ORWMP includes:

1. Characterizing the Otay River watershed's various natural resources and land uses and threats to its resources;
2. Identifying goals and objectives;
3. Identifying implementation strategies for the protection, enhancement, restoration, and management of beneficial uses and natural resources;
4. Developing an adaptive management strategy and objectives to ensure implemented strategies are effective;
5. Developing a water quality monitoring program to monitor, maintain, and enhance water quality; and
6. Developing a Plan that is consistent with the applicable local General Plans, local resource plans and programs, the Otay River watershed Special Area Management Plan (SAMP), the Municipal Storm Water Permit (San Diego Region National Pollutant Discharge Elimination System [NPDES] General Permit Order No. 2001-01), and that will be periodically updated to

be consistent with changing regulations, conditions in the watershed, and to ensure implemented strategies are successful.

Therefore, this document is the third component of the ORWMP. The fourth and fifth component products will provide the basis for the monitoring and evaluation program that will be essential in determining whether these strategies are effective, and if they are not, what changes should be made.

## **A.2 GUIDING GOALS, OBJECTIVES, AND ACTIONS**

The stakeholders, organized into five Interest Groups (Environmental, Regulatory, Recreation, Otay Valley Regional Park Citizens Advisory Committee, Property Owners and Business Owners), have been working collaboratively for the last several months to identify goals and objectives that will guide the development of the ORWMP. A list of goals and objectives was approved by consensus during the September 1, 2004, Working Group meeting, as well as by the ORWMP Policy Committee, consisting of the JEPa representatives, on December 13, 2004. This list is being revised to update some of the goals and objectives and to identify specific actions toward meeting particular goals and objectives. The goals are intended to provide the overall outcomes are targets desired; while the objectives are intended to provide measurable ways to achieve the goals; and the actions are specific steps to achieve the objectives. As with the other elements of the ORWMP, it is anticipated by all participants that this list will be updated as more is learned about the watershed and the effectiveness of implemented strategies is evaluated. The revised list currently under consideration is provided below, and the particular goals, objectives, and actions targeted by each recommended strategy are presented in Section B.

### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective A. Preserve additional open space.

Objective B. Protect natural landforms.

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

- |           |   |
|-----------|---|
| Action 1. | Provide a native buffer (e.g., 100 feet) between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife. |
| Action 2. | Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.                               |
| Action 3. | Manage groundwater use so that groundwater is maintained at levels that provide for a historic level of interflow, sufficient to support native habitat and wildlife.         |
| Action 4. | Remove and prevent reinfestation of invasive plant and animal species.  |
| Action 5. | Identify Best Management Practices to control erosion and contaminants at their sources to minimize aquatic resource degradation.   |
| Action 6. | Limit dry season runoff to seasonal wetlands such that plants and animals that depend on them will survive and the habitat types will not be converted to perennial habitats. |

Objective D. Protect wildlife movement and dispersal corridors.

Action 1. Provide a native buffer (e.g., 100 feet) between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

Objective F. Ensure no net loss of wetlands within the watershed.

**Goal 2. Ensure Reasonable, Sustainable, and Compatible Economic Development**

Objective A. Provide for housing, economic and community development, and public infrastructure that considers natural resources and water quality issues.

**Goal 3. Provide Educational and Recreational Opportunities**

Objective A. Provide for a multi-purpose trail system.

Action 1. Coordinate appropriate and adequate public access points and staging areas to the open space for recreational users.

Action 2. Maintain connectivity with other open space areas and trail systems.

Objective B. Implement an education program to promote stewardship of natural, cultural, and historical resources.

Action 1. Educate trail users about leash laws and the adverse effects of litter and animal waste on wildlife and natural habitats.

Action 2. Educate the community about the native flora and fauna.

Action 3. Develop programs to educate residents about the importance of keeping pets and domestic animals properly controlled (e.g., vaccinated, kept indoors, leashed, in a fenced or confined area away from wildlife, streams and floodplains) and maintained (e.g., regular disposal of generated wastes at an appropriate upland location).

Action 4. Conduct public education and outreach programs intended to prevent pollutants from entering stormwater runoff and reducing volume of runoff.

Action 5. Establish stewardship programs (including volunteer coordination and community volunteer patrols) to manage and monitor natural resources and open space.

Action 6. Educate residents adjacent to designated Open Space areas within the Otay River watershed about control and transfer of invasive plant species.

- Action 7. Require trail users to clean up after themselves and their pets and impose penalties.
- Action 8. Allow for additional recreational sites that avoid or minimize adverse effects on sensitive resources.
- Action 9. Provide a native buffer between passive and active recreation trails and urban centers, such that hikers, birdwatchers, and eco-tourists are not disturbed while seeking the enjoyment of nature.
- Objective B. Develop a GIS Mapping system compatible with the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego database.
  - Action 1. Make the GIS mapping available to the public via the Project Clean Water web-site or alternative media.

**Goal 4. Ensure Public Health and Safety**

- Objective A. Protect and enhance groundwater, surface water, and drinking water from sources of contamination, such as trash, debris, or other wastes entering waterways by storm runoff or illegal dumping.
  - Action 1. Identify areas of good and degraded water quality and design a plan to maintain or improve that quality.
  - Action 2. Conduct public education and outreach programs intended to prevent pollutants from entering stormwater runoff and reducing volume of runoff.
- Objective B. Seek to restore the hydrology of drainage ditches, concrete channels, and stormwater pipes to natural to the greatest extent practicable.
- Objective C. Provide flood management.
  - Action 1. Provide sediment control while allowing for natural sand replenishment.
- Objective D. Preserve the water absorption capacity of the watershed so that natural flow-capacity of waterways is not exceeded during storms.
- Objective E. Preclude development within the Otay River floodplain.
- Objective F. Provide a strategy for dealing with homeless occupation of open space areas in the watershed.

**Goal 5. Maximize Program and Plan Integration**

- Action 1. Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.

- Action 2. Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.
- Action 3. Acknowledge the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego General Development Plans, Community Plans, and Specific Plans, as well as zoning ordinances where appropriate.
- Action 4. Integrate the Goals and Objectives of the OVRP Concept Plan for the Western OVRP.
- Action 5. Integrate the Otay River Valley Cleanup Projects as envisioned in 2000.
- Action 6. Work with the County of San Diego to integrate future OVRP programs for the Otay Valley Regional Park.
- Action 7. Coordinate restoration efforts within the watershed between public, private, and local landowner and managers.

Objective B. Provide compliance with local, state, and federal agency requirements.

- Action 1. Adopt the Best Management Practices outlined in the City of San Diego “Source Water Protection Guidelines for new Development”.
- Action 2. Ensure that the Watershed Management Plan acknowledges the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego “Jurisdictional Urban Runoff Management Programs” (JURMPs) and Standard Urban Stormwater Mitigation Plan (SUSMPs).
- Action 3. Identify existing protections and avoid any duplicative or conflicting recommendations or processes with the requirements of State and federal agencies, such as the CDFG, RWQCB, USFWS, and the U.S. Army Corps of Engineers. A key example is the MSCP and the individual subarea plans.

### **A.3 DATA SOURCES**

Several data sources were used to develop the implementation strategies. The *Otay River Watershed Assessment Technical Report* (Aspen, 2004) provides important information regarding past, current, and anticipated future conditions of this watershed. This report also includes an evaluation of current preserves, and enhancement/restoration efforts in this watershed, such as the San Diego Bay National Wildlife Refuge, Otay Valley Regional Park, Multiple Species Conservation Program, Otay Ranch Preserve, BLM land, and the CDFG Ecological Reserves. The final section of this report provides the foundation for developing Planning Principles for each of nine identified sub-basins in this watershed. The *Otay River Watershed Special Area Management Plan Draft Planning Principles Report* (Jones and Stokes, 2005) being prepared under the SAMP process, more fully evaluates the physical and biological conditions in each sub-basin relative to existing and planned preserves, other land uses, and planning and regulatory tools such as general plans, ordinances, and the San Diego Region Municipal Permit (NPDES). Also, the locations and quality of stream resources, as delineated and evaluated by the U.S.

Army Corps of Engineers (Lichvar and Ericsson, 2003; Smith, 2004), have been considered in the development of the Planning Principles; as have the locations and extents of vernal pools and other seasonal aquatic features, which were obtained from regional data sources (SANDAG, 2004). The Planning Principles not only provide the key considerations in developing and evaluating alternative land-use scenarios under the SAMP; they also facilitate the identification of areas that should be protected, enhanced, and/or restored, and those areas where particular Best Management Practices (BMPs), such as stream set backs, particular agricultural practices, or restrictions on impervious surface cover, should be implemented. Additional sources of data included evaluation of 2004 aerial photography, field reconnaissance, and communication with watershed stakeholders. The *Characterization of Point and Nonpoint Water Quality Stressors on the Otay River Watershed* (RBF Consulting, 2005a) provides important information on the types, anticipated magnitudes, and locations of pollutants that threaten beneficial uses in the watershed. This report includes an evaluation of the baseline results from the *Otay Watershed Pollutant Loading Tool: Development and Application* (AQUA TERRA Consultants, 2005). This tool can be used to predict pollutant loadings in different parts (sub-basins) of the watershed as well as to predict BMP effectiveness.

#### **A.4 STRATEGY PRIORITIZATION**

The strategies have been assigned to high, medium, or low categories, based on the factors specified below. Strategies can be reprioritized based on additional stakeholder feedback, improved knowledge of watershed conditions, land-use restrictions, cost, or other considerations. In no particular order, factors used to prioritize particular actions, projects, or Best Management Practices (BMPs) for implementation include:

- Proximity to or positive effects on existing or planned preserves
- Protection and/or improvement in habitat functions or values
- Scale, size, and landscape position of the project (site specific, stream reach, stream, subwatershed, watershed)
- Importance to maintaining or enhancing habitat linkages or wildlife movement corridors
- Protection of landforms and aesthetic value
- Protection of cultural resources
- Protection and/or benefits to surface or groundwater quality
- Protection and/or enhancement of channel stability
- Protection of habitat types from conversion (e.g., the perennialization of ephemeral or intermittent streams)
- Effectiveness in reducing pollutant discharges or constituents of concern
- Economic, technological, and logistical feasibility.

In general, priority is based on the strategy's anticipated level of protection, enhancement, and/or restoration (with larger size or scale being better) of natural or cultural resources and its anticipated feasibility. This approach to prioritization reflects the stakeholder-identified goals, objectives, and actions, which are specified at the beginning of the description of each strategy. As an example, a strategy that would provide resource benefits to most or all of the watershed or larger region and would be feasible would receive a higher priority than one that would benefit specific areas in the watershed, particularly heavily urbanized areas, but would be expensive and difficult to implement. The strategy descriptions include anticipated time frame, but schedule was not used as a primary factor in this initial prioritization.

## B. STRATEGIES

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### Overview

Each strategy specifies activities, Best Management Practices (BMPs), or projects focused on achieving one or more of the stakeholder-identified WMP goals, objectives, and actions. For each identified strategy, information is provided in the following format:

- Target Goals, Objectives, Actions
- Activities and Benefits
- Locations
- Expected Proponents
- Schedule
- Maintenance and Monitoring Considerations
- First-Order Cost
- Potential Funding Sources

For each strategy, the **target goals, objectives, actions** are specified from the revised list initially presented at the March 2, 2005 Working Group meeting and amended at the April 6, 2005 meeting (therefore, target goals, objectives, and actions could change to reflect further revisions to the list). **Activities and benefits** describe the actions, BMPs, or projects proposed and how they would protect, enhance, restore, and/or manage beneficial uses in the Otay River watershed. **Locations** are where these activities would occur or apply, whether at specific sites, streams, sub-basins, or in the larger watershed. Depending on the strategy, **expected proponents** could be the County of San Diego, the Cities of Chula Vista, San Diego, Imperial Beach, the San Diego Unified Port District, other stakeholders, or a collaborative effort. Each strategy's expected implementation time frame is noted as short-term (within 2 years), intermediate-term (3-5 years), or long-term (more than 5 years) under **schedule**. **Maintenance and monitoring considerations** include aspects of the activities, BMPs, or projects beyond their actual implementation. **First-order costs** are order-of-magnitude estimates (i.e., less than \$10,000, \$10,000 to less than \$100,000, \$100,000 to less than \$1 million, \$ 1 million to less than \$10 million, \$10 million to \$100 million), unless more specific cost estimates can be provided. **Potential funding sources** include various local, State, or federal opportunities, such as proposition money, County or City funds, and local fees, which could be used to implement strategies and monitor their effectiveness.

This information is intended to provide stakeholders and decision-makers with key considerations for the initial evaluation of each strategy. If it is determined that a strategy appears to be worthwhile, it can be further investigated to fully evaluate its feasibility and expected benefits, and the specifics of how it will be implemented. The strategies have been preliminarily assigned to categories of high (Section B.1), medium (Section B.2), or low (Section B.3) priority, but they are not ordered by priority within each category (Table B-1). This is an initial list, which can be easily modified or reprioritized based on stakeholder input or additional data.

More details on monitoring and management approaches are provided in the upcoming document: *Otay River Watershed Adaptive Management Strategy and Objectives*. These documents and the *Water Quality Monitoring Strategy for the Otay River Watershed* (RBF Consulting, 2005b) provide a framework for protecting, enhancing, restoring, and managing the variety of beneficial uses in the Otay River watershed.

**Table B-1. List of Strategies by Priority**

<b>Priority</b>	<b>Strategy</b>
High	• Eradicate Non-Native Flora and Fauna and Prevent Reinfestation and New Introductions
	• Maintain, Enhance, and Restore Habitat Linkages and Wildlife Movement
	• Restore the Lower Otay River Floodplain to Enhance the Quality of Water Entering San Diego Bay
	• Implement Setbacks or Buffers Around Aquatic Resources for New Developments
	• Remove Existing and Limit Future Trash and Debris
	• Protect Drinking Water Quality in the Reservoirs
	• Limit Directly Connected Impervious Surface Area
	• Implement a Watershed-Wide Education Program to Improve Public Awareness and Stewardship
	• Form a Watershed Council or Equivalent to Implement and Update the Watershed Management Plan
Medium	• Retrofit Existing Developments as Necessary to Protect Aquatic Resources
	• Restore Urban Creeks
	• Implement Comprehensive Agricultural Land BMPs to Protect Aquatic Resources
	• Improve Existing and Create New Recreational Facilities
	• Preserve, Enhance, Restore, and Manage Tecate Cypress Forest and Oak Woodlands
Low	• Preserve, Enhance, and Restore Additional Parcels Within the Otay River Floodplain
	• Protect, Enhance, and Restore Cultural Resources

## **B.1. HIGH-PRIORITY STRATEGIES FOR WATERSHED PROTECTION, ENHANCEMENT, RESTORATION, AND MANAGEMENT**

The following strategies, in no particular order, are considered high priority for the Otay River watershed:

- Eradicate Non-Native Flora and Fauna and Prevent Reinfestation and New Introductions
- Maintain, Enhance, and Restore Habitat Linkages and Wildlife Movement
- Restore the Lower Otay River Floodplain to Enhance the Quality of Water Entering San Diego Bay
- Implement Setbacks or Buffers Around Aquatic Resources for New Developments
- Remove Existing and Limit Future Trash and Debris
- Protect Drinking Water Quality in the Reservoirs
- Limit Directly Connected Impervious Surface Area
- Implement a Watershed-Wide Education Program to Improve Public Awareness and Stewardship
- Form a Watershed Council or Equivalent to Implement and Update the Watershed Management Plan.

### **B.1.A Eradicate Non-Native Flora and Fauna and Prevent Reinfestation and New Introductions**

#### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

#### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

Action 4. Remove and prevent reinfestation of invasive plant and animal species.

Objective D. Protect wildlife movement and dispersal corridors.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

#### **Goal 5. Maximize Program and Plan Integration**

Action 1. Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.

Action 2. Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.

Action 7. Coordinate restoration efforts within the watershed between public, private, and local landowner and managers.

### *Activities and Benefits*

As discussed in the *Draft Habitat Restoration Plan for Otay Valley Regional Park* (HDR Engineering, 2004), there are numerous invasive, non-native species in this watershed, including giant reed (*Arundo donax*), tamarisk or salt cedar (*Tamarix ramosissima*), pampas grass (*Cortaderia selloana*), and castor bean (*Ricinus communis*). This draft plan offers a coordinated approach for reducing and controlling, if not eliminating, the populations of exotic plant species within the OVRP, the boundaries of which are shown in Figure 4. Non-native fauna were not addressed in this plan. More than 500 acres (27 percent) of exotic plants occupy the western third of the OVRP (between Heritage Road and the park's westernmost boundary approximately 0.5 mile west of I-5, known as the Phase I area). During their planning-level delineation of aquatic resources in this watershed, the U.S. Army Corps of Engineers (USACE) observed and mapped several invasive, non-native species, particularly downstream of Savage Dam (Lichvar and Ericsson, 2003), as shown in Figure 5. This delineation did not comprehensively identify non-native plant species in this watershed or their extents, nor did it identify or map non-native fauna.

The most detrimental of the non-native plant species in the region and this watershed are giant reed (*Arundo donax*) and salt cedar/tamarisk (*Tamarix* sp.). These species directly impair habitat-support functions and values and indirectly affect hydrologic and biogeochemical functions performed by aquatic ecosystems. Eradicating non-native species enhances habitat functions and values and protects habitats within the watershed from future infestations. Similarly, non-native fauna, including non-native turtles, frogs, crayfish, and brown-headed cowbirds, prey on or compete with native wildlife within the watershed. Therefore, their control or eradication would assist native wildlife in maintaining healthy populations. Furthermore, their removal could aid in the recovery of sensitive wildlife species, such as southwestern arroyo toad and least Bell's vireo, which occur in the watershed.

For this strategy to be effective, it will be necessary to identify the location and extent of non-native plant and animal species in the watershed. The mapping recently completed for the OVRP sufficiently identifies exotic plant species infestations in the Phase I area. However, this effort did not include assessments of exotic fauna nor did it extend into the remainder of the OVRP. Therefore, qualified biologists are needed to identify exotic flora and fauna throughout the watershed with the exception of exotic flora inside the OVRP Phase I area. All exotics should be mapped (e.g., using a Geographic Information System) to identify locations and infestations levels.

Once this baseline information is collected, the following steps will be necessary to successfully implement this strategy:

- Retain qualified wildlife biologists and botanists to prioritize species types and locations according to the California Exotic Pest Plant Council (CalEPPC) List A. The *Draft Habitat Restoration Plan for Otay Valley Regional Park* (HDR Engineering, 2004) offers an approach for prioritizing eradication efforts focused on non-native plants.
- Use these experts to identify the appropriate eradication methods (e.g., mechanical removal, direct herbicide application, cut-and-paint, trapping – will vary by target species, location in the watershed, timing of treatment, proximity of sensitive flora and fauna, and other factors).
- Identify affected property owners to educate them about the problem and to reach formal agreement on gaining access for eradication activities (initial and long-term treatments).
- Secure all necessary funding to undertake these activities (i.e., necessary funding, of course, includes money needed to retain experts to collect the initial baseline information and to complete all other listed steps).
- Complete the environmental documentation (CEQA and NEPA) and obtain the approvals (U.S. Army Corps of Engineers [Clean Water Act Section 404 permit], California Department of Fish and Game [Fish and

Game Code Section 1602 or Section 1605 Streambed/Lake Alteration Agreement], San Diego Regional Water Quality Control Board [Clean Water Act Section 401 Water Quality Certification/Porter-Cologne Water Quality Control Act Waste Discharge Requirements], State Water Resources Control Board [Clean Water Act Section 402 NPDES permit], U.S. Fish and Wildlife Service [Endangered Species Act Section 7 consultation – typically addressed through the Corps’ permitting process], State Historic Preservation Officer (National Historic Preservation Act Section 106 consultation – typically addressed through the Corps’ permitting process), local [encroachment permits]).

- Hire a licensed contractor to implement the eradication program (see maintenance and monitoring considerations, below).

For long-term effectiveness, it is imperative that this strategy also implement education and land management elements to prevent reinfestations as well as introductions of new pests. One element is preparing and distributing to watershed residents a free pamphlet containing a list of non-native plants to avoid or that are prohibited in this watershed (e.g., giant reed, salt cedar, pampas grass, fountain grass, castor bean, iceplant, pepper trees, jacaranda) and alternative native plants to use for landscaping, such as erosion control. Similarly, it is important to provide written notification of this eradication strategy to nurseries within and adjacent to the watershed, including a formal request that they not sell species on this list or contained within the CalEPPC List A. Proponents of this strategy could also prepare a more complete guidebook with the prohibited plant list and brief descriptions of the benefits of native and non-invasive landscapes, planting techniques, water conservation, and natural alternatives to fertilizers and pesticides (see high-priority strategy: Implement a Watershed-Wide Education Program to Improve Public Awareness and Stewardship). These educational materials should also advise residents and users about the importance of properly managing any exotic wildlife in their possession (e.g., bullfrogs and crayfish should not be released into the ecosystem).

The County and cities in the watershed should prohibit developers from using plants on the prohibited plant list as a condition for project approval. Furthermore, this list needs to be included in the CC&Rs and HOA Rules and Regulations to ensure residents do not use them in their landscaping. The prohibited plant list should be updated as new pest species emerge (see frequent publications from CalEPPC) or once every 3 years at a minimum. It would also be beneficial, perhaps through CC&Rs and HOA Rules and Regulations, to discourage residents and users from releasing non-native or domestic wildlife into the watershed.

### ***Locations***

It is expected that the majority of non-native plant species are concentrated west of the Otay Reservoirs (in the more urbanized areas of this watershed); although pockets have been observed in Hollenbeck Canyon, Proctor Valley Creek, Jamul Creek, Dulzura Creek, Poggi Canyon, Nestor Channel, other tributaries to the Otay River, and the Otay Reservoirs. While they have not been mapped comprehensively (with the exception of the California Department of Fish and Game’s Rancho Jamul Ecological Reserve), it is anticipated that non-native fauna, including bullfrogs, crayfish, and brown-headed cowbirds, are also concentrated west of the Reservoirs, in proximity to artificial ponds and urban areas. For example, brown-headed cowbirds are known to occur along the lower Otay River. Trapping programs have been successful in controlling this species to benefit the least Bell’s vireo.

### ***Expected Proponents***

Because non-native species in this watershed occur in multiple jurisdictions, the County should work with the Cities of Chula Vista, San Diego, and Imperial Beach to implement this strategy system-wide. If desired, a separate entity could be established and funded by these jurisdictions to execute this

strategy. Moreover, the jurisdictions might find it helpful to enlist the aid of a conservation entity to complete the eradication activities. For example, the Mission Resource Conservation District (MRCD) has been highly successful in removing giant reed and other non-native plant species in parts of the Santa Margarita River and San Luis Rey River watersheds. For these efforts, they worked with the regulatory and resource agencies to establish an in-lieu fee mitigation program, whereby they collected mitigation fees from parties seeking to impact aquatic resources (and as approved by the regulatory agencies), and the MRCD used these funds to eradicate non-native species. The Otay River watershed is within the Greater San Diego County RCD service area. While they do not currently have an exotics removal program, this RCD might be interested in establishing a similar program in the Otay River watershed given its abundant and varied sensitive habitats and species, many of which are in preserves. Whatever the chosen course of action, the arrangement among proponents could be formalized by a Joint Exercise of Powers Agreement (JEPA) or similar agreement.

### ***Schedule***

Sustainable removal of non-native plant species requires a minimum of 5 years, with 7-10 years often necessary to ensure full eradication. Because they are mobile, it is improbable that non-native fauna would be fully eradicated in this watershed. Non-native fauna and flora can be controlled, but some level of ongoing maintenance and monitoring would probably be required within this watershed, except for the most remote or isolated locations. It could also take several months to complete the required environmental documentation and to acquire the necessary federal, State, and local permits, particularly if (as expected) formal consultation with the U.S. Fish and Wildlife were required. Therefore, non-native species eradication in this watershed is a long-term project. Initial education and management elements of this strategy could be implemented over the short term (within 2 years), but watershed-wide changes in attitudes and behavior would require much longer.

### ***Maintenance and Monitoring Considerations***

Eradication of non-native species requires extensive follow-up treatments typically over the course of several years. To ensure success, a monitoring program would be required to track the eradication progress and to determine whether approaches should be modified to increase effectiveness. As discussed, full eradication of non-native fauna would not be expected, except in isolated watershed areas. Long-term monitoring of treated areas would be required by the regulatory agencies if mitigation fees were used to partially or fully fund eradication activities.

### ***First-Order Cost***

Because the full extent of infestation is unknown, the cost of this effort cannot be determined at this time. Estimates of non-native species eradication activities in this region range from \$5,000-\$60,000 per acre, depending on the intensity of infestation, the type of infestation (including the number of retreatments necessary), and assuming property acquisition or easements are not necessary. Replanting with native species tends to increase cost toward the higher end of the range, but can assist the recovery of treated areas and increase their resistance against reinfestation. Use of volunteers could reduce costs, but some training will be required as will full-time oversight by licensed professionals. Assuming a conservative estimate of 1,000 acres infested in this watershed, the cost of eradicating non-native plant species would range from \$10 million to \$50 million. Eradication of non-native fauna could occur concurrently, but as noted, would probably need to continue indefinitely.

The costs associated with distributing a prohibited plant list or a guidebook of prohibited plants and native alternatives, and notifying nurseries of these pests could be kept well under \$100,000. The costs

for the jurisdictions to update their plan review and approval processes are not known, but would not be expected to exceed \$100,000.

### ***Potential Funding Sources***

As discussed, an in-lieu fee program could provide an important funding source for exotic species eradication. Typically, a conservation entity manages the collection of mitigation funds, the eradication of non-native species, and the follow-up maintenance, monitoring, and agency reporting. A more formal mitigation bank is also an option, in which the banking entity undertakes the eradication activities and sells the credits to parties impacting wetlands/waters and needing mitigation to pay off their investment. These banks require the development of a mitigation banking instrument, including agreements with the U.S. Army Corps of Engineers and other water resource agencies, and the oversight of a multi-agency Mitigation Bank Review Team. Mitigation banks are less popular because of the time and resource commitments needed for approval. Other potential funding sources include grant funding, bond money (such as Propositions 40 and 50), federal agency money (e.g., National Fish and Wildlife Foundation Pulling Together Initiative—specifically for removing noxious plant species), State money (e.g., California State Coastal Conservancy Watershed Enhancement Program and the Wetlands Recovery Project Work Plan), and local money.

### **B.1.B Protect, Enhance, and Restore Habitat Linkages and Wildlife Movement**

#### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

#### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective A. Preserve additional open space.

Objective B. Protect natural landforms.

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

- Action 1. Provide a native buffer between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.
- Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.
- Action 4. Remove and prevent reinfestation of invasive plant and animal species.
- Action 5. Identify Best Management Practices to control erosion and contaminants at their sources to minimize aquatic resource degradation.

Action 6. Limit dry season runoff to seasonal wetlands such that plants and animals that depend on them will survive and the habitat types will not be converted to perennial habitats.

Objective D. Protect wildlife movement and dispersal corridors.

Action 1. Provide a native buffer (e.g., 100 feet) between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

### ***Activities and Benefits***

As shown in Figure 6, there are several known habitat linkages that connect the Otay River watershed with open space of adjacent watersheds and provide wildlife movement opportunities. Wildlife movement is an important landscape-level function that facilitates connectivity, population dynamics, and gene flow and helps maintain regional ecological integrity. Therefore, it is critical to protect, and if possible, enhance existing and restore historic habitat linkages. Protecting habitat linkages may initially begin with acquiring land or easements and expand to include long-term monitoring, enhancement, and/or restoration activities. Enhancing or restoring corridors may consist of eradicating non-native plant species; planting native vegetation; establishing cover; removing or redirecting lighting, noise, and other disturbance factors; or adding or modifying structures that aid in safe wildlife passage such as appropriately designed culverts or tunnels, overcrossings, and associated wildlife fencing.

Proponents of this strategy will need to perform several tasks:

- Establish a wildlife corridor and linkages inventory for the entire watershed using existing inventories and publications.
- Retain wildlife movement experts to evaluate the current condition of known and potential habitat linkages (use strategies currently developed by the County of San Diego Department of Public Works, or coordinate with or directly involve the Conservation Biology Institute [CBI]).
- Prioritize and protect habitat linkages, and conduct movement studies to assist in the protection, enhancement, and/or restoration of viable movement corridors, using input from the available experts.
- Develop specific protection, management, enhancement, and/or restoration protocols for each linkage, beginning with the highest priority linkages.
- Contact and reach formal agreement with willing property owners to manage their properties or to allow for the preservation of connectivity, enhancement or restoration that would benefit habitat linkages over the long-term (note that unwilling property owners might require reprioritization of projects).
- Secure all necessary funding to undertake these activities (i.e., necessary funding, of course, includes money needed to retain experts to establish the inventory and to complete all other listed steps).
- Complete any required environmental documentation (NEPA and CEQA) and obtain federal, State, and local approvals for feasible projects.
- Hire any needed contractors to implement the activities (see maintenance and monitoring considerations, below).

### ***Locations***

As shown in Figure 6, the two main linkages facilitating regional wildlife movement between the Otay River watershed and adjacent areas are: (1) the Otay River Valley, linking the San Diego Bay and Otay Mountain; and (2) Otay Mountain, linking the Otay River watershed to the Tijuana River watershed (Penrod, 2001). Otay Mesa Road/SR 905 is a threat to the latter linkage, while the former is well protected by a series of wildlife movement corridors or linkages in public ownership. Other key linkages that should be targeted for protection, enhancement, and/or restoration activities include:

- *San Miguel Mountains/Proctor Valley/Otay Ranch.* Prior to the October 2003 fires, San Miguel Mountain supported coastal sage scrub, chamise chaparral, southern mixed chaparral, native grasslands, vernal pools, and alkali meadow (City of Chula Vista, 1993). A significant portion of the Mountain is within the Otay Ranch Preserve. At this time, the area functions as a wildlife linkage and is currently not constrained. The Otay Ranch Resource Management Plan determined this area to be a wildlife linkage between San Miguel Mountain and the Sweetwater Reservoir and River, located to the north and northeast, respectively. In addition, the area may facilitate movement from Proctor Valley to the south and Jamul Creek to the east, connecting the Jamul Mountains with the San Ysidro Mountains.
- *Sweetwater River/McGinty Mountain/Hollenbeck Canyon.* Implementation of the Sweetwater-Loveland Open Space and Habitat Management Plan provided a linkage from Sweetwater Reservoir through to the McGinty Mountain area at the northeastern end of the Otay River watershed. The McGinty Mountain area encompasses large tracts of undeveloped land, including an existing Nature Conservancy Preserve and adjacent high quality native plant and wildlife habitat.
- *Jamul Mountains/Lower Otay Reservoir.* Prior to the October 2003 fires, Jamul Mountain, a large topographic feature northeast of Lower Otay Reservoir, supported coastal sage scrub, chamise chaparral, and live oak woodland. The oak woodlands provide unconstricted wildlife movement across these lands, although future development plans are unclear at this time. Monitoring locations are recommended as part of the MSCP regional wildlife movement monitoring program (CBI, 2003a).
- *Jamul Mountains/San Ysidro Mountains.* Much of this area is conserved as part of the MSCP, and wildlife movement across this region is facilitated by a multitude of canyons (e.g., Little Cedar and Cedar canyons) that are administered by the BLM. However, there is some uncertainty regarding future development in the major amendment area on the East Otay Mesa. Nevertheless, open space preservation of the East Otay Mesa hills in the San Diego County Subarea may contribute to wildlife movement from the Tijuana River watershed to the Otay River watershed through this area.
- *Spring Canyon/Dennery Canyon /West Otay Mesa.* Although Spring Canyon is located on top of the mesa south of the Otay River Valley, this isolated canyon drains into the Tijuana River Valley. The only connection between the Spring Canyon and Dennery Canyon open spaces to the Otay River Valley is through a culvert under Otay Mesa Road/State Route 905 (CBI, 2003b), near Heritage Road. The culvert is known to be used by coyotes and gray foxes, but also seems to provide restricted crossing opportunities for bobcat and mountain lion. Mule deer were not found during transect surveys in this area. Perhaps a larger culvert could be installed to increase wildlife movement. The Spring Canyon area is becoming more isolated by surrounding development and is losing its value as a wildlife corridor.
- *Johnson Canyon/O'Neal Canyon/Otay River Valley.* This area functions as a linkage between the Otay Lakes, the Otay River Valley, Otay Mountain, and adjoining open space (CBI, 2003a). Wildlife movement is adequately facilitated through the Otay River Valley and adjoining canyons connecting the mesa with the valley. Wildlife movement through O'Neil Canyon, which supports gnatcatcher-occupied coastal sage scrub, probably functions as a part of the regional wildlife corridor to Otay Mesa and beyond, as well as the local wildlife corridor to the Otay River Valley. Wildlife culverts and tunnels allow for movement through a constriction point under Alta Road, which appears to be used by wildlife (as evidenced by game trails and coyote scat). In addition, the MSCP planned preserve design took "unconstricted" wildlife movement in this area into consideration. A large part of this linkage will be preserved as mitigation for the Otay Ranch development project and Caltrans' SR-125 project, and habitat management and restoration for the Johnson Canyon Preserve will be provided to facilitate wildlife movement (EDAW, 2003).

- *Salt Creek/Otay Valley.* Salt Creek used to be a regional wildlife corridor for Quino checkerspot butterfly, cactus wren, and California gnatcatchers (Ogden, 1992). However, development of the Eastlake communities and Otay Ranch have fragmented the upper creek. While large mammal movement may have never occurred in this area, restoration and preservation of Salt Creek may continue to provide important dispersal habitat for these species.
- *Hollenbeck Canyon/Rancho Jamul.* The Hollenbeck Canyon Wildlife Area and Ranch Jamul Ecological Reserve open spaces managed by the California Department of Fish and Game comprise a large block of wildlife movement corridors and linkage in the County (CBI, 2003b), linking the Otay Ranch Preserve to lands in the east. Both open space preserves are separated by State Route-94. While culverts appear to facilitate wildlife movement underneath this highway in three to five locations, the 2003 fires and subsequent watershed runoff have partially blocked these passage routes. Wildlife movement target species across this swath of land include coyote, gray fox, bobcat, mule deer, and mountain lion. The CDFG is currently preparing land management plans for these open spaces, including provisions and management assisting wildlife movement (USGS, 2002; TAIC, in progress).
- *Poggi Canyon/Wolf Canyon/Otay River Valley.* Key biological resources within Poggi Canyon, Wolf Canyon, and Otay River Valley may also offer restricted linkages between the three areas as identified in the Otay Ranch Resource Management Plan (City of Chula Vista, 1993). Poggi Canyon does not function as a terrestrial wildlife movement corridor due to constrictions from the Olympic Parkway straightening and the installation of rock check-dams throughout. The canyon may continue to have value as a bird dispersal area (CBI, 2003a). Wolf Canyon is continuous with Otay River Valley via a narrow linkage west of Rock Mountain. This linkage may act primarily for bird dispersal, but may also facilitate small mammal movement. Wolf Canyon should be considered in future analysis to identify potential management, enhancement, or restoration opportunities.
- *Hollenbeck Canyon/Lyons Valley/Lee Valley.* One of the potential future corridors identified by the MSCP is in the vicinity of Lyon Canyon, linking the northeastern portion of the watershed with U.S. Forest Service Land (i.e., Cleveland National Forest) to the east. This potential future corridor is within the County of San Diego's "Pre-Approved Mitigation Area", and as with other MSCP Planned Preserve areas, it should be a priority for land acquisition and enhancement.

### ***Expected Proponents***

The individual jurisdictions could lead the protection, enhancement, and restoration efforts within their boundaries. The County of San Diego would be responsible for most of these activities, because the majority of the known linkages occur within the unincorporated portions of the watershed. However, linkages extend across jurisdictions and watershed boundaries, and it would be more effective for the jurisdictions to work collaboratively. A JEPA could formalize the jurisdictions' intent to protect and improve habitat linkages both within this watershed and to adjacent watersheds. The CBI has considerable data on the watershed and regional habitat linkages, and could assist in prioritizing parcels for acquisition, enhancement, or restoration, as well as structural improvements (e.g., under- or over-crossing locations or modifications). Their involvement could increase stakeholder acceptance and could assist in obtaining grant funding.

### ***Schedule***

Protecting habitat linkages could involve providing wildlife crossings on a project level, potentially combined with habitat acquisition, public easements, or working with property owners to maintain contiguous wildlife movement corridors. Several factors will dictate how quickly these activities can occur, such as jurisdictional priorities, property owner willingness to sell or manage their properties for the benefit of wildlife movement, and funding. It might be possible to acquire key parcels over the short-term, but an effective program focused on protecting, enhancing, restoring, and managing habitat

linkages and wildlife movement corridors would involve a long-term commitment to studies, before and after implementation, as well as actual implementation and follow-up actions.

### ***Maintenance and Monitoring Considerations***

Maintenance and monitoring would be critical to the success of any activities or projects focused on benefiting wildlife movement. For example, long-term, intensive studies would be required to ensure a new road undercrossing is facilitating wildlife passage. Limited usage would suggest that the undercrossing requires modification (e.g., larger undercrossing, more wildlife fencing) or that additional features (e.g., additional undercrossings) are needed. Monitoring is also needed on preserve or protected properties to evaluate their usage by wildlife and to determine if habitat enhancement or restoration is warranted.

### ***First-Order Cost***

Because this strategy could include several different types of activities and projects, the cost is not known at this time. To develop a realistic cost estimate, it will be necessary to specify what will occur, which will depend on evaluating linkage conditions, prioritizing activities, and the other factors specified above. Property acquisition in southern California is extremely costly (\$100,000 per acre is not unusual), and any enhancement or restoration activities and long-term maintenance and monitoring would increase the cost further (averaging \$30,000-\$80,000 per acre, depending on the habitat type and the level of effort). Obviously, costs would be lower if property acquisition is not required or it could occur within existing public right-of-way (e.g., State Route 94 or 905).

### ***Potential Funding Sources***

Adding or modifying structural features related to State transportation facilities, such as culverts and bridges and associated wildlife fencing (e.g., State Routes 94 and 905), could be funded by the California Resources Agency State Gasoline Tax Environmental Enhancement and Mitigation Program. The National Fish and Wildlife Foundation and NOAA Challenge Grants could be used for wildlife corridor and movement enhancements, because they are specifically set aside for projects that promote fish and wildlife conservation in which movement is a key component to maintaining viable populations. There are many funding sources available to acquire, enhance, and restore native habitat. These include California Department of Parks and Recreation Habitat Conservation Fund, Wetlands Recovery Project Work Plan, and bond money distributed by the State Water Resources Control Board under Propositions 40 and 50.

## **B.1.C Restore the Lower Otay River Floodplain to Enhance the Quality of Water Entering San Diego Bay**

### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

#### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

Action 1. Provide a native buffer between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.

Action 4. Remove and prevent reinfestation of invasive plant and animal species.

Objective D. Protect wildlife movement and dispersal corridors.

Action 1. Provide a native buffer (e.g., 100 feet) between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

Objective F. Ensure no net loss of wetlands within the watershed.

#### Goal 4. Ensure Public Health and Safety

Objective C. Provide flood management.

Action 1. Provide sediment control while allowing for natural sand replenishment.

Objective D. Preserve the water absorption capacity of the watershed so that natural flow-capacity of waterways is not exceeded during storms.

#### Goal 5. Maximize Program and Plan Integration

Action 1. Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.

Action 2. Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.

Action 3. Acknowledge the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego General Development Plans, Community Plans, and Specific Plans, as well as zoning ordinances where appropriate.

Action 4. Integrate the Goals and Objectives of the OVRP Concept Plan for the Western OVRP.

Action 6. Work with the County of San Diego to integrate future OVRP programs for the Otay Valley Regional Park.

- Action 7. Coordinate restoration efforts within the watershed between public, private, and local landowner and managers.

### *Activities and Benefits*

The health of San Diego Bay is dependent on the quality of the water entering it, which includes surface and groundwater from the Otay River watershed. Therefore, any activity, BMP, or project that improves the quality of surface or groundwater in the Otay River, particularly downstream of Savage Dam (which hydrologically disconnects the upper and lower watershed, except during extreme storm events), will improve the quality of water entering the San Diego Bay. In the *San Diego Integrated Natural Resources Management Plan* (UPSD, 2000), sponsored by the U.S. Navy and the Unified Port District of San Diego and developed by numerous stakeholders, restoration of the lower Otay River including the salt pond area and the historic floodplain were identified as key actions for improving Bay water quality.

Currently, a substantial portion of the lower Otay River is levied, particularly downstream of I-5. Several floodplain restrictions also occur between I-5 and I-805 (e.g., Hollister Street dip crossing and the Hanson Spancrete Pacific Gravel Processing Plant in the river bottom). These impacts limit the Otay River's floodplain's capacity to provide a full range of riparian functions; as indicated by low (generally less than 0.5, out of a maximum of 1) hydrologic, water quality, and habitat integrity scores calculated by the U.S. Army Corps of Engineers Engineer Research and Development Center for this portion of the Otay River (Figures 7-9). In addition to storage of flood waters and supporting riparian habitat, floodplains are critical to providing numerous biogeochemical functions such as nutrient cycling and the detention and transformation of contaminants. The latter functions are dependent on the area of the floodplain available to store and treat flows and the duration of water-soil and water-vegetation contact. Therefore, if the levees and other floodplain restrictions are removed, there will be an increased potential for these functions to occur over a greater area and at a higher frequency, which will filter excess nutrients and contaminants and improve the quality of the water entering San Diego Bay. In addition, the floodplain will provide better filtration if it is regraded to provide macro- and micro-topographic features (e.g., pits, secondary channels, hummocks) and it develops a well-developed riparian community.

To be most effective, this strategy will require the completion of the following steps:

- Retain restoration ecologists, fluvial geomorphologists, or experts with similar training to evaluate the existing floodplain impediments/constraints and opportunities for restoration. Candidate impediments/constraints to remove or relocate out of the historic 100-year floodplain include:
  - The earthen levees downstream of I-5 (see note below)
  - The pipelines and other utility infrastructure (e.g., sewage pump station, power poles downstream of I-5)
  - The Otay River low-water concrete crossing at Saturn Boulevard and other roadway fills within the 100-year floodplain (e.g., Hollister Street)
  - The Hanson Spancrete Pacific Gravel Processing Plant and its associated access roads (off Hollister Street and 7<sup>th</sup> Avenue) and infrastructure immediately upstream of Hollister Street and the San Diego Trolley Bridge.
- Coordinate with the San Diego National Wildlife Refuge and the Otay Valley Regional Park participants regarding their planned restoration activities along the lower Otay River to determine what remains to be completed.

- Have the experts prioritize the impediments/constraints not planned for removal and evaluate other restoration opportunities (in consideration of the *Draft Habitat Restoration Plan for the OVRP* [HDR Engineering, 2004], the restoration work under the San Diego Bay NWR, any other restoration efforts for the lower Otay River, and local opportunities and constraints).
- Contact and reach formal agreements with the property owners to determine which impediments/constraints can be removed and what other restoration opportunities can be realized, and reprioritize as necessary.
- Secure the necessary project funding to remove as many impediments/constraints and restore as much of the lower Otay River floodplain as possible (i.e., necessary funding, of course, includes money needed to retain experts to collect the initial baseline information on impediments/constraints/opportunities and to complete all other listed steps).
- Prepare formal restoration plans, including project design and specifications.
- Complete the necessary environmental documentation (NEPA and CEQA) and secure the required federal (including a LOMR/CLOMR from the Federal Emergency Management Agency if levees are removed or relocated; see note below), State, and local permits to complete these activities.
- Hire contractors as needed to complete these activities (also see maintenance and monitoring considerations, below).

While removal of the levees could greatly increase restoration potential, it is important to note that this activity would require coordination with the Federal Emergency Management Agency through their Letter of Map Revision/Conditional Letter of Map Revision (LOMR/CLOMR) process. Moreover, it will be important that flooding into the urban margin does not occur, which could otherwise increase contaminant concentrations and reduce water quality benefits.

The overall goal should be to minimize the amount of grading required to maximize the reconnection of the Otay River to its historic floodplain, at an affordable cost and with minimal disturbance to sensitive wildlife and vegetation in the area. It might be sufficient to remove impediments, allow the Otay River to reestablish a more natural course during the next wet season, and follow-up with regular exotics removal, as-needed grading to increase floodplain engagement and topography, and targeted native plantings to expedite reestablishment of a well-developed, self-sustaining riparian community.

Restoration efforts should also include removing/relocating salt pond berms to restore salt marsh, brackish marsh, mudflat, and eelgrass habitats. The San Diego Bay National Wildlife Refuge Comprehensive Plan Process has been focusing on restoration of these habitat types near the salt works.

### ***Locations***

This strategy would focus on identifying, prioritizing, and implementing restoration actions along the lower Otay River, downstream of Savage Dam (and primarily downstream of I-805). Some of this restoration is expected to occur in the next several years as part of the development of the Otay Valley Regional Park and the fuller implementation of the San Diego Bay National Wildlife Refuge. Lower Otay River areas not restored under either program should still be restored to maximize the area of floodplain available to provide aquatic functions that benefit water quality and wildlife.

### ***Expected Proponents***

The County of San Diego and the Cities of Chula Vista and San Diego have been working with the Citizens Advisory Committee to develop the OVRP, which will restore some of the floodplain along the lower Otay River. The *Draft Habitat Restoration Plan for the Otay Valley Regional Park* (HDR Engineering, 2004) provides an initial approach to these restoration activities, which are mainly focused

on removing exotic plant species and planting natives. The U.S. Fish and Wildlife Service is working with stakeholders on the San Diego Bay NWR restoration work along the lower Otay River, which is expected to involve removal/relocation of some levee sections. These entities, the City of Imperial Beach, and the San Diego Port District should be involved in additional habitat restoration activities, because they all have an interest in the health of the lower Otay River and the San Diego Bay. A JEPA or similar agreement could formalize their intent to implement this strategy.

### ***Schedule***

Restoration activities are in their planning phases, and actual restoration activities and follow-up maintenance and monitoring will take several years to accomplish. Therefore, restoration activities along the lower Otay River are long-term (more than 5 years) activities.

### ***Maintenance and Monitoring Considerations***

Habitat restoration involves a substantial commitment to follow-up maintenance and monitoring. Physically disturbed areas, such as graded areas, are susceptible to infestation by invasive, non-native species, of which there are currently several in this watershed. In fact, the December 2004 draft report identified more than 500 acres of exotic plants between Heritage Road and the western boundary of the OVRP (i.e., 27 percent of this portion of the OVRP). In addition, it is important to monitor the effectiveness of revegetation efforts and to take appropriate remedial actions as necessary, to ensure successful establishment of self-sustaining native habitat. With the focus of this strategy on the quality of the water entering the Bay from this watershed, monitoring should include the analysis of a range of constituents (including those specified in the San Diego Basin Plan). A useful monitoring approach, referred to as a BACI (Before-After-Control-Impact) design, is the analysis of water entering (considered the control site) and leaving (considered the impact site) the restored areas both before and after activities have started. In this way, the benefits to water quality can be tracked and, if necessary, remedial actions can be undertaken to maximize these benefits while still providing a full array of habitat-related benefits.

### ***First-Order Cost***

Restoration of habitat can cost in excess of \$75,000 per acre, which includes implementation, maintenance, and monitoring, including reporting to the regulatory agencies. This cost can easily double or triple if land acquisition is necessary. Costs can be significantly higher if, for example, it is necessary to replace a low-water crossing (e.g., Hollister Street) with a bridge. Therefore, significant floodplain restoration along the lower Otay River is expected to cost well in excess of \$10 million.

### ***Potential Funding Sources***

There are several funding sources available for restoration of habitat, particularly floodplains and projects that would benefit water quality. The U.S. Fish and Wildlife Service will implement significant restoration work for the San Diego Bay NWR (South San Diego Bay Unit), as will the County and other participants to develop the OVRP. Funding for these and other restoration activities could come from many sources, including Propositions 40 and 50. The California State Coastal Conservancy, using a variety of funding sources, has been a key player in undertaking several river parkway restoration projects in southern California.

### **B.1.D. Implement Setbacks or Buffers Around Aquatic Resources for New Developments**

#### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

#### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective B. Protect natural landforms

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

Action 1. Provide a native buffer between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.

Action 5. Identify Best Management Practices to control erosion and contaminants at their sources to minimize aquatic resource degradation.

Action 6. Limit dry season runoff to seasonal wetlands such that plants and animals that depend on them will survive and the habitat types will not be converted to perennial habitats.

Objective D. Protect wildlife movement and dispersal corridors.

Action 1. Provide a native buffer (e.g., 100 feet) between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

#### **Goal 2. Ensure Reasonable, Sustainable, and Compatible Economic Development**

Objective A. Provide for housing, economic and community development, and public infrastructure that considers natural resources and water quality issues.

#### **Goal 5. Maximize Program and Plan Integration**

Action 1. Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.

Action 2. Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.

Action 3. Acknowledge the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego General Development

Plans, Community Plans, and Specific Plans, as well as zoning ordinances where appropriate.

Objective B. Provide compliance with local, state, and federal agency requirements.

- Action 1. Adopt the Best Management Practices outlined in the City of San Diego “Source Water Protection Guidelines for new Development”.
- Action 2. Ensure that the Watershed Management Plan acknowledges the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego “Jurisdictional Urban Runoff Management Programs” (JURMPs) and Standard Urban Stormwater Mitigation Plan (SUSMPs).
- Action 3. Identify existing protections and avoid any duplicative or conflicting recommendations or processes with the requirements of State and federal agencies, such as the CDFG, RWQCB, USFWS, and the U.S. Army Corps of Engineers. A key example is the MSCP and the individual subarea plans.

### *Activities and Benefits*

#### *Background*

In this case, setbacks are defined as the distance measured from the rear lot line or edge of developed area to a natural feature, such as a stream or vernal pool. In generally, the County or cities can require setbacks to avoid hazards, avoid conflicts, or minimize impacts. Buffers in this case are biological and physical landforms that protect the ecological functions of a natural feature, such as a stream or vernal pool. Establishing setbacks or buffers around aquatic resources provides physical separation and habitat transition between sensitive natural resources and habitats (e.g., streams, riparian habitats, vernal pools) and urbanized areas that could potentially threaten these natural areas through predation by domestic animals, noise, lighting, trampling, urban runoff, etc. The San Diego Region Municipal Permit and County and City stormwater ordinances identify setbacks as an important BMP for protecting natural resources. These intervening areas, if managed in a natural state, can protect channel stability, protect the quality of receiving waters, minimize intrusion by humans and non-native wildlife and plants, and dampen noise and light that might otherwise adversely affect wildlife using aquatic resources or adjoining transitional habitat. To maximize protection of aquatic resources, the vegetation community in the intervening area must consist of native plant species to avoid habitat degradation over time, enhance wildlife habitats, and protect aquatic resources. In cases where it is not practicable to exclude all non-native species in the setback or buffer area, at a minimum, the County and Cities in the watershed should ensure, as a condition of project approval, that none of the species on the prohibited plant list (see high-priority strategy: Eradicate Non-Native Flora and Fauna and Prevent Reinfestation and New Introductions) would be planted within this area. In addition, it will be important to restrict residents from accessing these buffer areas to minimize adverse effects to vegetation communities and wildlife. Restrictions could include installation of fences, planting of discouraging vegetation (e.g., nettles, thorny species), or erecting educational or “No Trespassing” signs. Moreover, the jurisdictions should modify their project approval processes to require developers to include CC&Rs, Homeowners Association (HOA) Rules and Regulations, or similar means to specify nearby natural resource areas that should be avoided by residents, visitors, and their pets and domestic animals. Provisions should

include appropriate native plantings on private properties, including HOA common areas, adjacent to or included in these buffer areas.

It is important to note that there is new construction in the watershed that is not avoiding or setting back from all aquatic resources; and there might be particular cases in the future where it will be necessary to impact aquatic resources. In these situations, the construction is and will still be subject to federal and State regulations and permit requirements, which require avoidance and minimization of impacts and compensation for unavoidable impacts. The federal and State agencies are increasingly approving mitigation credit for buffer areas, so there is a legitimate incentive to include buffers in project designs. Moreover, at the County level, there are three ordinances that require or encourage buffers or setbacks from various aquatic resources, such as wetlands, streams, and vernal pools, in the unincorporated areas. These are the Resource Protection Ordinance (RPO), the Biological Mitigation Ordinance (BMO), and the Watershed Protection, Stormwater Management, and Discharge Control Ordinance (WPO). The RPO includes provisions to protect wetlands and wetland buffers. The Cities of Chula Vista, San Diego, and Imperial Beach have similar Best Management Practices in their stormwater ordinances, but buffers or setbacks are one of many options that can be implemented. Also, the County is currently in the process of formulating criteria for required wetland buffer setbacks ranging from 25 feet to 200 feet, depending on a number of different factors. These factors include the existence of hydrophytic vegetation, condition of the existing wetland, whether the wetland/buffer serves as a wildlife corridor, existence of sensitive species, and the connectivity and condition of the wetland upstream and downstream.

#### *The Strategy in the Otay River Watershed*

A comprehensive watershed-specific plan should be developed that considers the County's buffer criteria and the findings of the *Otay River Watershed Special Area Management Plan Draft Planning Principles Report* (Jones and Stokes, 2005), the *Otay Watershed Pollutant Loading Tool: Development and Application* (AQUA TERRA Consultants, 2005), and the *Stormwater Management BMPs for the Otay River Watershed* (RBF Consulting, 2005c). It is expected that setbacks/buffers would need to be greater for vernal pools, higher-order streams (i.e., with larger floodplains), sensitive habitat areas, areas supporting sensitive species, areas where the wetland/buffer serves as a wildlife corridor, connectivity and condition of aquatic habitat upstream and downstream, proximity to existing or planned preserves or locations upstream of existing or planned preserves, areas of better infiltrating (Group A or Group B) soils, or sensitivity to sediment loading. This plan should be prepared by qualified fluvial geomorphologists/hydrologists, water quality specialists, and conservation biologists under the direction of the jurisdictions. Following approval of the plan, the jurisdictions should update their project review and approval process to ensure the appropriate setbacks/buffers are used for each new development project. As noted, these buffers would not apply to existing development, and there might be cases where new development could not avoid all aquatic resources. The jurisdictions would need to determine how to address these situations at the local level; these impacts would still be subject to federal (U.S. Army Corps of Engineers) and State (State Water Resources Control Board and San Diego Regional Water Quality Control Board, California Department of Fish and Game) regulations.

#### *Locations*

This BMP should be implemented to the extent practicable throughout the watershed to protect aquatic resources. However, the open space and preserve areas east, south, and north of the Otay Reservoirs, along Otay Mesa, and in proximity to Wolf Canyon, are particularly at risk from future urbanization, as detailed in the *Otay River Watershed Special Area Management Plan Draft Planning Principles*

*Report* (Jones and Stokes, 2005). Inadequate buffers or setbacks in one portion of the watershed can adversely affect the functions and values of downstream resources through increased erosion, sedimentation, and intrusion by invasive species, inputs of nutrients or contaminants, or other anthropogenic impacts.

Figures 10-19 illustrate the relationship between the various aquatic resources relative to land use in the nine different sub-basins comprising this watershed. The boundaries for these nine sub-basins were originally delineated in the *Otay River Watershed Special Area Management Plan Draft Planning Principles Report* (Jones and Stokes, 2005). In these figures, land use is differentiated as existing/planned preserves and existing/planned development. Clearly, in the eastern watershed, many of the aquatic features are within preserve areas or areas that will be preserved. Nevertheless, many aquatic resources at the boundaries of these protected areas are at risk; as are areas outside of the MSCP or other preserves (although local, State, and federal laws and regulations afford them some protection). In addition, impacts to streams and other aquatic resources upstream of these preserve areas could be translated downstream and adversely affect these protected areas. Therefore, great attention should be given to implementing adequate setbacks in proximity to and upstream of existing or planned preserve areas.

In contrast, many of the aquatic habitats downstream of Savage Dam have been adversely affected by urbanization (e.g., Poggi Canyon, Nestor Channel, portions of the Otay River). Notable exceptions (at least for significant direct impacts) include Wolf Canyon, O'Neal Canyon, Johnson Canyon, and Dennerly Canyon. However, some development is planned or already under construction in these areas, and effective setbacks will be a key means of protecting these streams and any adjoining aquatic habitats such as vernal pools. In the lower watershed, potential vernal pool complexes at risk include those in the vicinity of Wolf Canyon near Otay Landfill and upper Johnson Canyon. Vernal pools fringing upper Dennerly Canyon are already protected by fencing and setbacks.

### ***Expected Proponents***

The County and cities in this watershed would be in the best position to ensure that this strategy is implemented in their portions of this watershed. They could formalize their commitment to implement this strategy through a JEPA or similar agreement. Through their respective plan approval processes, the jurisdictions should require that project applicants in this watershed include setbacks/buffers into their project plans (i.e., Site Design BMP). As noted above, jurisdictions could also require developers to add CC&Rs, HOA Rules and Regulations, or similar instruments focused on minimizing incursions of non-native species into aquatic resource and setback or buffer areas. The development of such requirements are currently being evaluated by the County.

### ***Schedule***

The preparation of the plan and the updates to the jurisdictions' plan review and approval processes could occur within the short-term. Implementation could take longer if there is insufficient support by the jurisdictions or the strategy becomes controversial.

### ***Maintenance and Monitoring Considerations***

To ensure the identified setback distances or buffers are effectively protecting aquatic resources, there should be monitoring of aquatic resources in the different sub-basins by geomorphic setting, land use

type, and other factors identified above. This monitoring could be conducted by the implementing jurisdiction, an entity established or approved to undertake these activities, or a coordinated effort agreed to by a JEPA or similar agreement. If necessary, the setback distance in a particular sub-basin or portion of a sub-basin could be increased to ensure full protection. Conversely, monitoring might indicate that the setback distance in a particular sub-basin or portion of a sub-basin could be reduced and still protect the resources.

### ***First-Order Cost***

The costs to prepare the plan, have each jurisdiction modify their project review and approval process, and to monitor the setback/buffer effectiveness could exceed \$100,000, depending on the scope and duration of monitoring implemented. It is possible that applicants could realize less project revenue in having to design or redesign projects to avoid and setback from aquatic resources. However, on balance, such revenue losses to the development community would be expected to be low, given the current ordinances in place (RPO and WPO), which require protection of aquatic (e.g., streams, floodplains, vernal pools, other wetlands, wetland buffers) and other natural resources. This type of BMP was included in the 2001 Municipal Permit and the WPO.

### ***Potential Funding Sources***

The jurisdictions could charge developers fees in cases where they cannot avoid aquatic resources or implement adequate setbacks to protect these resources. These funds could help offset the costs of updating the jurisdictions' project approval process and managing the strategy/program. To accomplish this, each jurisdiction would need to adopt a fee ordinance that establishes fair-share fees in accordance with the Mitigation Fee Act. In addition, the jurisdictions could fund this program. Bond money might also be available; although wide-scale implementation of a BMP providing indirect benefits to aquatic resources might not be viewed by grant agencies as high of a priority as projects that directly protect, enhance, or restore aquatic resources.

## **B.1.E Remove Existing and Limit Future Trash and Debris**

### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

#### **Goal 4. Ensure Public Health and Safety**

Objective A. Protect and enhance groundwater, surface water, and drinking water from sources of contamination, such as trash, debris, or other wastes entering waterways by storm runoff or illegal dumping.

Objective F. Provide a strategy for dealing with homeless occupation of open space areas in the watershed.

#### **Goal 5. Maximize Program and Plan Integration**

Action 1. Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.

- Action 2. Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.
- Action 5. Integrate the Otay River Valley Cleanup Projects as envisioned in 2000.

### ***Activities and Benefits***

This strategy is intended to build upon the extensive on-going actions by the OVRP Citizens Advisory Committee (CAC) to clean up trash along the lower Otay River, around the Otay Reservoirs, and into Proctor Valley. The CAC has overseen the collection and disposal of more than 1,200 tons of trash during the last several years (John Willett, personal communication). Trash is a source of contaminants that can adversely affect aquatic resources, as well as diminish the aesthetics of the watershed. Trash and debris dumping is a known problem along Proctor Valley Road in the upper watershed. The concern of trash-related adverse effects to beneficial uses is significant enough that Proctor Valley Creek in the Proctor Valley Hydrologic Subarea (910.32) is on the State Water Resource Control Board's Monitoring List, which means it is considered high priority to evaluate whether it will be listed on subsequent Section 303(d) and/or Total Maximum Daily Load (TMDL) lists.

A more formal program should be established to coordinate the current and on-going clean-up efforts. To be successful, this strategy would require several actions:

- Coordinate with the OVRP Citizens Advisory Committee to evaluate activities that have occurred, those planned, other watershed areas that should be targeted for trash and debris removal or for further study (i.e., reconnaissance-level survey), as well as information on techniques and resources available (see expected proponents, below).
- Enter the information on these activities into the watershed GIS (update annually or more frequently).
- Prepare a priority list of areas that require additional clean up and new areas to target.
- Contact property owners and reach formal agreements for access to complete the clean-up activities (lack of access could necessitate reprioritization of activities).
- Obtain funding as necessary to complete all of these steps and the listed activities.
- Complete the necessary environmental documentation (NEPA and CEQA) and obtain the required federal, State, and local approvals to continue these activities over the long-term.
- Maximize use of volunteers and other free/inexpensive labor (e.g., prisoners), and use contractors as-needed to complete listed activities.
- For new development projects in this watershed, require the use of trash- and debris-related Best Management Practices, such as those described by the City of San Diego Water Department in their *Source Water Protection Guidelines for New Development* (January 2004). The jurisdictions could make this a requirement of the project approval process. In addition, the jurisdictions could require applicants to prepare specific CC&Rs, HOA Rules and Regulations, or similar means to educate and impose restrictions on residents and prescribe penalties on those who dump trash or debris into stormdrains, detention basins, natural waterways, or other aquatic features.
- Identify existing developments in the watershed that are a major source of trash and debris (e.g., no, ineffective, or improperly maintained trash- and debris-related BMPs) and work with land owners/HOAs/residents to reduce these sources through BMP modifications or retrofitting.

### ***Locations***

The lower Otay River is known to have a trash and debris problem, as are several of the Otay River's culverted or development-adjacent tributaries (e.g., Nestor Channel, Poggi Canyon, the unnamed tributary through Loma Verde Park). There are many sources for these inputs, including homeless encampments in the river bottom. The OVRP CAC has made great strides in remedying the trash and debris problem, but more clean-up is needed as are efforts to minimize future sources. It is well known that trash and debris dumping also occur in the upper watershed along Proctor Valley Road. Trash and debris is likely a problem in other parts of the watershed as well and should be comprehensively identified, with the assistance of the CAC and as-needed reconnaissance-level surveys, as the first step in maximizing implementation of this strategy.

### ***Expected Proponents***

Watershed-wide trash clean-up activities could be formalized through a JEPA or cooperative agreement among the County, Cities, the OVRP CAC, and the major land managers (USFWS, CDFG, BLM, and the U.S. Forest Service). Each party could develop a trash and debris management plan that specifies protocols for dealing with trash in their areas of responsibility or control, or they could give the OVRP CAC primary responsibility for directing these activities watershed-wide. The jurisdictions would need to be more active in cases involving land owner or resident coordination and changes in BMPs. The jurisdictions should also take the lead in educating watershed residents in their areas of responsibility about the adverse effects of trash and debris on the natural resources (e.g., yearly inclusion of a flyer on the issue in the water bill) (see also high-priority strategy: Implement a Watershed-Wide Education Program to Improve Public Awareness and Stewardship). Whichever party leads this program should coordinate with the appropriate County and City departments to relocate any homeless out of the Otay River, streams, and other open space areas. While the WMP is not the appropriate vehicle for providing alternative housing to the homeless, it is appropriate for the WMP to recognize that homeless occupation of open space areas (particularly aquatic areas) has adverse effects on the natural resources on this watershed; and that this is a stressor the jurisdictions need to better address at the local level. This party would also need to ensure that encampments are removed and disposed of at approved upland locations.

### ***Schedule***

Trash and debris removal activities have been underway for the last several years and are making great progress in this watershed. However, other degraded areas within the watershed remain. If the jurisdictions work with property owners, land managers, the CAC, and volunteers, much of the trash and debris clean-up could occur within 2 years (short-term activity). The education process can also begin immediately, but attitudes, cultural, and behavioral changes can take much longer to achieve. Structural improvements, such as trash booms, trash racks, in-line separation units, or pipe controls can take longer to get approved, designed, and constructed (particularly if on private property). These latter efforts would be expected to require an intermediate-term (3-5 year) or perhaps long-term (more than 5 years) horizon.

### ***Maintenance and Monitoring Considerations***

Trash and debris removal will be an on-going activity, especially if educational programs are not effective in minimizing future introductions. If structural improvements are incorporated, follow-up maintenance and monitoring will be necessary to ensure they are effective and functioning properly.

### ***First-Order Cost***

If stakeholders and others are willing to volunteer their time and disposal costs are waved, the trash removal process itself can be of minimal cost on an annual basis. To date, disposal costs for collected debris and trash have been waived. Program costs would be kept lower if there continue to be no or minimal disposal costs. However, there are other costs to consider. For example, there would be smaller costs associated with producing and distributing educational materials within the watershed. Use of paid crews would greatly increase costs. Construction and maintenance of structural controls could be much more expensive (hundreds of thousands or millions of dollars).

Overall, costs for this strategy would be expected to exceed \$10,000 and could exceed \$1 million if structural BMPs are incorporated in existing infrastructure. The cost of including structural BMPs in new developments would be the responsibility of land developers/builders, and the long-term maintenance would probably be the responsibility of the governing jurisdiction or individual HOAs. The costs associated with modifying BMPs or, where practicable, retrofitting existing developments could be borne by the jurisdiction or landowner/developer/HOA/residents, depending on the circumstances.

### ***Potential Funding Sources***

Efforts to-date have been mainly orchestrated by the CAC and volunteers. There are grant funding sources available for non-profit, grass-roots, and community-based groups and volunteer efforts, such as the Wetlands Recovery Project Small Grants Program, the California Department of Fish and Game's Habitat Conservation Fund, Land and Water Conservation Fund, and the Recreational Trails Program, as well as the NOAA Community Based Habitat Restoration National and Regional Partnership Grant and Community-Based Restoration program. Bond money from Proposition 40 and 50 can also be used for these activities through the Murray-Hayden Urban Parks and Youth Services Program. Also, it might be possible to evaluate the primary contributors of trash in this watershed and impose a fee-based system to fund future clean-up.

## **B.1.F Protect Drinking Water Quality in the Otay Reservoirs**

### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

#### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.

Action 5. Identify Best Management Practices to control erosion and contaminants at their sources to minimize aquatic resource degradation.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

#### **Goal 2. Ensure Reasonable, Sustainable, and Compatible Economic Development**

Objective A. Provide for housing, economic and community development, and public infrastructure that considers natural resources and water quality issues.

Goal 5. Maximize Program and Plan Integration

Objective B. Provide compliance with local, state, and federal agency requirements.

Action 1. Adopt the Best Management Practices outlined in the City of San Diego “Source Water Protection Guidelines for new Development”.

***Activities and Benefits***

The City of San Diego Water Department developed *Source Water Protection Guidelines for New Development* (January 2004) to protect their drinking water reservoirs from future development in the portions of the San Diego County watersheds draining into them. The focus of this strategy is to implement these Guidelines so that all new development contributing runoff to the Otay Reservoirs adequately protects the quality of the water both within and draining into the Otay Reservoirs. The most effective means of implementing this strategy is for the responsible jurisdictions (i.e., the County of San Diego, the City of Chula Vista, and the City of San Diego) to require that all new projects in these upper watershed areas draining to the Reservoirs adhere to these Guidelines through implementation of appropriate BMPs. Implementation of these BMPs will undoubtedly protect other natural resources in the upper watershed as well, such as streams and wetlands. These Guidelines include Project Design BMPs, such as minimizing paved/impervious areas, incorporating zero-discharge features (e.g., ponds, vegetated depressions to route runoff through), and maximizing natural spaces and landscaping. They also include Source Control BMPs, such as minimizing dry weather or low flows, sheltering stored materials from washoff, minimizing excessive irrigation (e.g., using drip irrigation, containing irrigation water onsite), and using drought-tolerant and native plant species requiring less irrigation. Moreover, they include Treatment BMPs, such as extended detention basins, check dams, gabions, baffle boxes, trash racks, booms, settling basins, and sand filters, which can include vegetation. In some cases, BMPs in series or “treatment trains” can be more effective. Urban runoff is viewed as a resource that can be captured and treated with infiltration techniques (for recharge, which is particularly important in the upper watershed).

It is important to note that these Guidelines do not address water quality concerns during construction activities, which are instead left to the stormwater programs administered by the State Water Resources Control Board and the San Diego Regional Water Quality Control Board (e.g., San Diego Region Municipal Permit) and the jurisdictions’ implementing stormwater and grading ordinances.

***Locations***

The location would be the entire developable portion of the upper Otay River watershed that drains into the Otay Reservoirs (approximately 60 percent of the watershed’s area) (i.e., the Proctor Valley, Lee, Savage, Engineer Springs, Jamul, Lyon, and Hollenbeck Hydrologic Sub Areas). Most of this area is within the County’s jurisdiction, but portions are within the jurisdiction of the City of Chula Vista and the City of San Diego.

***Expected Proponents***

The City of San Diego has developed these Guidelines and is an obvious proponent, with a vested interest in protecting the quality of the water in the Otay Reservoirs. As discussed above, the County of

San Diego and the City of Chula Vista should also implement these Guidelines in those portions of the watershed in their respective jurisdictions that drain into the Upper or Lower Otay Reservoirs; especially because this stored drinking water is distributed to many of their residents.

### ***Schedule***

It is expected that incorporating the Guidelines into the jurisdictions' project approval process for projects in the upper watershed would be a short-term activity (within 2 years). Actual BMP implementation, particularly Treatment BMPs, could take several more years to achieve.

### ***Maintenance and Monitoring Considerations***

The County and the Cities of Chula Vista and San Diego would need to conduct monitoring to ensure that the Project Design, Source Control, and Treatment BMPs identified are effectively protecting water quality within the Otay Reservoirs. The City of San Diego already monitors water quality in the Otay Reservoirs and a few of the drainages in this watershed. The County and Cities would need to determine if additional monitoring is required, in additional streams, for more constituents, or at projects that represent particular types/classes of development and BMPs. The City of San Diego is probably in the best position to continue with the monitoring; but the other jurisdictions should participate in the decision-making regarding what else is monitored and provide their fair shares of the funding. The current Guidelines include standards for a dozen constituents (based on the San Diego Region Basin Plan and the latest information), which if met over time, should protect water quality in the Otay Reservoirs and other beneficial uses.

### ***First-Order Cost***

The total cost of the jurisdictions updating their project approval processes is expected to be less than \$100,000. The monitoring program to track the effectiveness of the identified BMPs is expected to be more costly (more than \$100,000 but probably less than \$1 million). Monitoring costs would be higher if the program continues for several years or in-perpetuity. The City of San Diego currently monitors the quality of the water in the reservoir and would likely continue that effort. As noted, the other jurisdictions should participate in determining whether additional monitoring should occur and provide their shares of the funding.

### ***Potential Funding Sources***

The jurisdictions could require developers in the upper watershed to pay a fee to help fund the BMP-effectiveness monitoring. The jurisdictions could also fund the monitoring themselves. Because this strategy would implement a large-scale water quality protection program, it would probably be eligible for Propositions 40 and 50 money. Other sources of funding include the Nonpoint Source Implementation Grant Program by the State Water Resources Control Board.

## **B.1.G Limit Directly Connected Impervious Area**

### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

Goal 1. Protect, Enhance, and Restore Watershed Resources

Objective B. Protect natural landforms

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.

Action 5. Identify Best Management Practices to control erosion and contaminants at their sources to minimize aquatic resource degradation.

Action 6. Limit dry season runoff to seasonal wetlands such that plants and animals that depend on them will survive and the habitat types will not be converted to perennial habitats.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

## Goal 2. Ensure Reasonable, Sustainable, and Compatible Economic Development

Objective A. Provide for housing, economic and community development, and public infrastructure that considers natural resources and water quality issues.

## Goal 4. Ensure Public Health and Safety

Objective A. Protect and enhance groundwater, surface water, and drinking water from sources of contamination, such as trash, debris, or other wastes entering waterways by storm runoff or illegal dumping.

Action 1. Identify areas of good and degraded water quality and design a plan to maintain or improve that quality.

Objective C. Provide flood management.

Objective D. Preserve the water absorption capacity of the watershed so that natural flow-capacity of waterways is not exceeded during storms.

## Goal 5. Maximize Program and Plan Integration

Action 1. Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.

Action 2. Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.

Objective B. Provide compliance with local, state, and federal agency requirements.

Action 1. Adopt the Best Management Practices outlined in the City of San Diego “Source Water Protection Guidelines for new Development”.

Action 2. Ensure that the Watershed Management Plan acknowledges the City of Chula Vista, City of San Diego, City of Imperial Beach, and the

County of San Diego "Jurisdictional Urban Runoff Management Programs" (JURMPs) and Standard Urban Stormwater Mitigation Plan (SUSMPs).

### *Activities and Benefits*

#### *Background on Impervious Cover as an Indicator*

Urbanization of watersheds tends to increase the areal extent of impervious surfaces (e.g., roads, houses, schools). This increase results in several hydrologic and water quality impacts, including: reduced vegetative interception of precipitation, reduced infiltration and soil moisture recharge, increased surface water runoff, decreased lag time from precipitation to stream runoff, increased peak flows, increased channel erosivity, increased downstream discharge, and reduced local groundwater recharge. Research has demonstrated that even modest (i.e., 10 percent) increases in impervious surfaces on the landscape can lead to increases in surface runoff and degradation of water quality for downstream receiving waters, such as creeks, wetlands, and bays (Center for Watershed Protection, 1999). Limiting impervious surface area or disconnecting it from surface drainage features (e.g., by routing runoff through infiltration features such as basins or by directing it to the sanitary sewer system) could protect aquatic resources from further degradation. The *Source Water Protection Guidelines for New Development* (City of San Diego Water Department, 2004) provide several approaches of disconnecting impervious area from surface waters.

While there are adverse effects associated with increasing impervious surfaces in general, it is important to keep in mind that the degree of these effects can vary by watershed location. For example, replacing a well-vegetated, loam soil area with concrete would typically have a greater effect on the stream system than if that same area instead is grazed and has clay silty soil that was replaced by concrete. For this reason, there might be situations where it is helpful to examine more than impervious surfaces.

Imperviousness can be evaluated for a drainage area (e.g., watershed, sub-watershed, catchment), based on the land uses within it. Uncompacted, native habitat has the lowest impervious surface cover (i.e., 0 percent), whereas concrete has the highest imperviousness (i.e., 100 percent). While correlations have not been firmly established for the arid southwest, in many regions of the country, an impervious surface percentage of as little as 10 percent measurably degrades streams, with more severe degradation occurring as impervious cover increases (Schueler, 1994). Recent research by the County of San Diego has suggested protecting areas with 15 percent or less cover to limit further degradation (by minimizing increases in percent impervious cover in these areas above 15 percent) and redeveloping in areas with more than 40 percent impervious cover (County of San Diego, 2003). The County also recommends clustering development as opposed to the "urban sprawl" approach, which requires construction of more infrastructure to support and, therefore, increases imperviousness on larger scales. They further recommend the establishment of development districts in each watershed (and sub-watershed) in the County, each of which would have different management prescriptions.

#### *The Strategy in the Otay River Watershed*

Using the County of San Diego's land use-impervious surface assumptions, all of the Hydrologic Sub-Areas (HSAs) in this watershed are below 15 percent impervious cover (Figure 20). Only the western portion of the Otay Valley Hydrologic Area (roughly west of I-805) exceeds this threshold (48 percent). The eastern portion of the Otay Valley Hydrologic Area is rapidly developing and will exceed this

threshold in the near future (Figure 21). Therefore, there is a real opportunity to minimize the adverse effects associated with increasing impervious surface cover in this watershed; particularly in the Proctor Valley, Jamul, Lee, Lyon, Hollenbeck, Engineer Springs, and Savage Hydrologic Sub-Areas, which are where most of the preserve areas are located. There is less opportunity in the Otay Valley Hydrologic Area, but efforts could focus on disconnecting impervious surface cover in the eastern portion of this area to decrease adverse effects.

As proposed, the jurisdictions would implement this strategy by tracking and placing specific limits on a new project's contribution to impervious surface area, depending on its proposed location within the Otay River watershed. This would require that applicants calculate the impervious surface area of their project and how much would be directly connected to surface water, and for the applicable jurisdiction to determine whether the project could occur as proposed (i.e., proposed location, overall impervious surface area, amount of directly connected impervious surface area). However, it is recommended that full implementation of this strategy not occur until additional research is conducted in the Otay River watershed, to ensure the percentages of impervious surface area (including what is directly connected) in the different Hydrologic Sub-Areas (similar to sub-watersheds) are reasonably accurate.

What follows are the County of San Diego's initial prescriptions for differentially urbanized areas in watersheds, including the establishment of sub-watershed development districts.

#### Preservation Areas

Preservation Areas would be designed to protect streams of existing good water quality and have the following characteristics:

- Relatively high percentages of wooded land and open space (> 30 percent)
- Relatively low percentages of urban/suburban land uses with low amounts of impervious cover (< 15 percent)
- Relatively few contaminated sources such as hazardous waste sites and wastewater discharges
- Relatively good water quality, which supports the beneficial uses.

Development occurring within the Preservation Watershed District would not exceed 15 percent impervious cover per parcel.

#### Restoration Areas

Restoration Areas would be designed to restore poor stream water quality and have the following characteristics:

- Relatively low percentages of wooded land and open space (< 30 percent)
- Relatively high percentages of urban/suburban land uses with low amounts of impervious cover (> 15 percent)
- Relatively high densities of contaminant sources such as wastewater discharges
- Relatively poor water quality, which is impaired.

Development occurring within the Restoration Watershed District would not exceed 50 percent impervious cover per parcel. Opportunities to retrofit existing developments would be evaluated to enhance or restore water quality.

Within sub-watersheds, the County recommends applying the following parameters or zones to these focused areas (through establishment of Sub-Watershed Development Districts):

Urban Growth and redevelopment would be concentrated and focused in the already developed watersheds where the impervious surface coverage exceeds 40 percent. The focus is to enact development policies that encourage retrofitting to restore water quality, and incentives are provided to focus redevelopment and stormwater retrofitting along urban waterways.

Suburban Growth would be applied in the watersheds with 16 to 40 percent impervious coverage. The focus, again, is to enact development policies that encourage retrofitting to restore water quality. Suburban growth areas would be prioritized to acquire and protect the remaining undeveloped lands. Suburban growth would be directed toward the watershed with existing impervious coverage of 16 to 40 percent provided that rooftop and pavement area of the development does not exceed this threshold.

Open Space acquisition and conservation would be applied within the relatively undeveloped watersheds where the impervious surface coverage is below 15 percent. These “green” open space watersheds would have low intensity development designed to protect the existing good water quality. Pursuant to this ‘zone’, new development would be permitted in the watershed identified for open space preservation provided the gross impervious coverage at build out does not exceed 10 to 15 percent.

If development in one zone is approaching a threshold, additional development could be directed to another zone that can tolerate the additional impervious surface area. To provide flexible development options, the program could also contain stormwater credits that permit the impervious cover thresholds to be increased at no more than 5 percent for successful incorporation of certain techniques, such as:

- Disconnection of rooftop runoff splash onto lawns or infiltrate into the groundwater table
- Revegetation of disturbed areas along riparian stream corridors
- Removal of impervious surfaces from onsite or from other watersheds
- Acquisition and protection of open space offsite through conservation easements.

### ***Locations***

The entire watershed would be targeted by this strategy. Given that the majority of preserve and open space areas are east of the I-805 (and the lowest percentages of impervious surfaces), this strategy would provide the most benefit to these areas (Figure 6). West of I-805, efforts should focus on disconnecting impervious surface area associated with existing development from surface waters.

### ***Expected Proponents***

The County of San Diego Department of Planning & Land Use Watershed Planning Program has conducted research and prepared a White Paper addressing impervious surface area, including how impervious surface area could be used for differential planning approaches in County watersheds and subwatersheds (County of San Diego, 2003). Also, most of the land within this watershed is unincorporated County land. Therefore, the County of San Diego is ideally suited to lead this effort; although, as addressed in their White Paper, they would need to work with the other jurisdictions, perhaps through a JEPA, to successfully implement this strategy watershed-wide. After all, each jurisdiction can only determine how land development proceeds within its own boundaries.

### ***Schedule***

The County of San Diego has already conducted substantial study of this issue. Given the importance of controlling impervious surface area in watersheds and the implications for where and how future development would proceed, the County would probably want to conduct additional studies; perhaps in collaboration with the other jurisdictions. In fact, additional modeling and mapping studies were recommended in the County's 2003 White Paper; and it is recommended that additional study occur to more accurately map the impervious surface areas in the different parts of this watershed. More time would be needed to adopt the establishment of the development districts and to update the jurisdictions' project approval processes to ensure impervious surface controls are implemented. Implementation could occur over the intermediate term (3-5 years), but could take longer depending on what additional studies are deemed necessary and how quickly the jurisdictions adopt this strategy.

### ***Maintenance and Monitoring Considerations***

Because the relationships between percent impervious surface area and effects on aquatic resources have not been well established for the arid southwest, it will be critical to monitor the actual effects associated with future urbanization in the watershed. Also, as noted above, the effects of adding impervious surfaces can vary depending on factors such as soil type and vegetative cover. If monitoring suggests that the threshold percentages for development districts are not protecting natural resources (it is worth noting that they are higher than used in other parts of the country), the percentages or parameters might need to be changed.

### ***First-Order Cost***

Restricting the directly connected impervious surface area is not expected to substantially increase development costs. Implementation of this strategy could result in redistribution of development from a more natural zone to a more urbanized one (which could save infrastructure costs) or could involve directing runoff from developments into infiltration areas or to the sanitary sewer system to limit or preclude it from entering the stormwater conveyance system. Similar BMPs are included in the Municipal Permit and the jurisdictions' stormwater ordinances, so this is not a new design concept. The main change would be adhering to specific impervious cover limits. It is expected that there would be costs associated with funding whatever additional studies the jurisdictions determine are necessary as well as undertaking formal adoption and project approval update processes. These costs could exceed \$100,000, depending on the level of effort. There would also be costs associated with updating the project approval processes as well as resource monitoring, the scope of which would depend on the type, frequency, and duration of monitoring.

### ***Potential Funding Sources***

The jurisdictions could require developers to pay a stormwater fee depending on their increase in impervious surface area or how much directly impervious surface area their projects would contribute to the development districts in which they occur. The fees could be used to manage the program, including the follow-up monitoring. The jurisdictions could also provide funding, as they have done for the initial studies. If benefits to water quality can be shown, proposition money could also assist this effort, such as Propositions 40 and 50.

## **B.1.H Implement a Watershed-Wide Education Program to Improve Public Awareness and Stewardship**

### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

**Goal 3. Provide Educational and Recreational Opportunities**

Objective B     Implement an education program to promote the stewardship of natural, cultural, and historical resources.

- Action 1.        Educate trail users about leash laws and the adverse effects of litter and animal waste on wildlife and natural habitats.
- Action 2.        Educate the community about the native flora and fauna.
- Action 3.        Develop programs to educate residents about the importance of keeping pets and domestic animals properly controlled (e.g., vaccinated, kept indoors, leashed, in a fenced or confined area away from wildlife and streams and floodplains) and maintained (e.g., regular disposal of generated wastes at an appropriate upland location).
- Action 4.        Conduct public education and outreach programs intended to prevent pollutants from entering stormwater runoff and reducing volume of runoff.
- Action 5.        Establish stewardship programs (including volunteer coordination and community volunteer patrols) to manage and monitor natural resources and open space.
- Action 6.        Educate residents adjacent to designated Open Space areas within the Otay River watershed about control and transfer of invasive plant species.
- Action 7.        Require trail users to clean up after themselves and their pets and impose penalties.

**Goal 4. Ensure Public Health and Safety**

Objective A.     Protect and enhance groundwater, surface water, and drinking water from sources of contamination, such as trash, debris, or other wastes entering waterways by storm runoff or illegal dumping.

- Action 2.        Conduct public education and outreach programs intended to prevent pollutants from entering stormwater runoff and reducing volume of runoff.

***Activities and Benefits***

This strategy is essential to the long-term protection and enhancement of natural resources and water quality within the Otay River watershed and the effective implementation of the Otay River Watershed Management Plan. By raising awareness and gaining the participation of residents and users, it is possible to change the behaviors that lead to the majority of the watershed stressors. Nevertheless, some stressors stem from social impairments, such as the homeless population in the Otay River, and require specialized efforts beyond education.

This strategy focuses primarily on developing and distributing educational materials and curricula, and conducting workshops, tours, and enhancement/restoration events designed to inform residents and users on the dynamics of the watershed and the benefits of living responsibly within this watershed. While education is critical, it is equally important to involve residents and users in the enhancement and restoration activities. Participation in trash removal, weed removal, and native species planting builds a sense of stewardship in the community. What follows is a four-phase approach to implement this strategy:

(1) *Stakeholder outreach.* This component is already underway, beginning with the formation and participation of the Working Group in the Otay River Watershed Management Plan development process. The Working Group currently has representatives from six different interest groups (i.e., Recreation, OVRP Citizens Advisory Committee, Environmental, Regulatory, Property Owners and Business Owners), and it is strongly recommended that a new interest group be formed comprised of educators and others focused on Watershed Education.

- Continue to invite residents, other users, educators, regulators, and resource managers to participate in Working Group meetings.
- Form an interest group for Watershed Education.
- Facilitate the meetings to determine the priorities and goals for Watershed Education, and include in the WMP goals and objectives.
- Facilitate the remaining phases of implementing this strategy pursuant to the actions described below or formulate an alternative implementation approach.
- Amend the program on a regular basis to best reflect the changing watershed and the interests of students, teachers, residents, and other watershed users.

(2) *Program Integration and Coordination*

- Identify existing programs that can be utilized as models to efficiently develop the Otay River Watershed Educational Program. An initial list of organizations with environmental education programs include the following.
  - County of San Diego Multiple Species Conservation Program Outreach and Education
  - County of San Diego Project Clean Water
  - California Regional Environmental Education Community (CREEC)
  - U.S. Environmental Protection Agency – Adopt Your Watershed
  - U.S. Fish and Wildlife Service – Education for Conservation
  - U.S. Fish and Wildlife Service – National Wildlife Refuge Complex
  - North American Association for Environmental Education (EELink)
  - San Diego Natural History Museum
- Identify out-door classroom opportunities operated by land managers, rangers, or docents that are willing and able to assist in regular education events. Begin with the preserves, parks, and open space areas within the watershed and the adjacent Sweetwater and Tijuana watersheds. An initial list of possible outdoor classrooms and/or field trip locations include the following.
  - USFWS South San Diego Bay Unit of the San Diego Bay National Wildlife Refuge
    - Sweetwater Marsh - Chula Vista Nature Center
  - USFWS Otay/Sweetwater National Wildlife Refuge

- Tijuana Estuary Visitor Center and Nature Trails
- Bureau of Land Management Otay Mountain Wilderness Area
  - Otay Truck Trail and Minnewawa Truck Trail
- CDFG Rancho Jamul Ecological Reserve
  - Educational Facilities located in the Headquarters Building; Parking Lot; limited trails for passive recreation, including hiking, birdwatching, scientific research, etc. (outdoor classrooms currently exist at this reserve, including several nature watching field trips organized by the San Diego Natural History Museum)
- Otay Valley Regional Park
  - Current facilities include nature trails and limited parking areas, future opportunities will include staging areas, kiosks, water fountains, and parking lots.

*(3) Develop educational materials, design programs and curricula, and distribute them to the public.*

- Develop a general watershed guidebook to living responsibly in the watershed and include references and contact information to specific resources and educational materials. An excellent example of this type of guidebook is *Living Lightly in Our Watersheds, A Guide for Residents of the Malibu Creek Watershed and Adjoining Watersheds* available at <http://www.malibuwatershed.org> (Malibu Creek Watershed Advisory Council).
- Develop more specific educational materials to supplement the general watershed guidebook. Suggested topics for educational materials include:
  - Watershed and stream ecology
  - Sensitive resources in the Otay River watershed
  - Invasive flora and fauna and their adverse effects
  - Native alternatives to non-native plant use in erosion protection
  - Trash and debris – proper disposal methods and locations
  - Native, native cultivars, and drought tolerant landscaping
  - Alternatives to traditional fertilizers, herbicides, and pesticides
  - Water conservation practices in the arid southwest
  - Responsible pet ownership and management
  - Household pollutant control
  - Stormwater pollution prevention
  - The importance of reduction, reuse, and recycling
- Form small teams of individuals or consultants to focus on developing materials for the topics listed above. For example, a small team of two or more individuals with knowledge, experience, or interest in native plants could draft a native landscape handbook for the Otay River watershed. The handbook would then be reviewed, amended, and finalized by the larger Watershed Education interest group and/or Working Group. In this way, materials focused on various topics can be drafted simultaneously.
- Design educational programs for a suite of media including E-mail, video (VHS and DVD), class curricula (handouts, workbooks, projects), newspapers, flyers, pamphlets, guidebooks/handbooks, tours, field trips, signs, and kiosks.
- Seek peer review of the materials from the HOAs, school districts, reserve managers, and others that are not directly involved with the Working Group.

- Post all information on the Project Clean Water website or other websites such that the material can be obtained easily and inexpensively.

#### *(4) Implementation*

- Provide training to educators about environmental and watershed-related curricula.
- Coordinate watershed tours and field trips to natural areas led by educators, docents, or resource managers with experience in the dynamics, locally native flora and fauna and other natural resources, and stressors in the watershed.
- Facilitate community involvement through watershed-improvement activities. Suggested activities include:
  - Trash clean-up days
  - Trail and fence maintenance
  - Weed removal and replanting
  - Water quality monitoring (e.g., assisting the San Diego Stream Team)
  - Wildlife monitoring and vegetation mapping
- Facilitate community education through regular workshops and presentations. Suggested topics include:
  - Landscaping with natives, focusing on the benefits of using native species and native cultivars over non-native species
  - Water quality monitoring
  - Environmentally friendly pet ownership
  - Living responsibly with the resources in the watershed (e.g., properly disposing of trash and debris, water conservation practices, the importance of reduction/reuse/recycling).
  - Easy steps residents and other users can take to protect the watershed from pesticides, herbicides, detergents, and other potential household contaminants, such as sweeping instead of washing down driveways, taking cars to a car wash that recycles water instead of washing it at home, using biodegradable soaps and detergents, and natural alternative to pesticides.
  - Upcoming opportunities for participating in watershed enhancement or restoration projects
- Ensure that individual jurisdictions serve as community models in implementing the educational materials being distributed to the residents and users (“teach by example”).
  - Use natives, native cultivars, or drought-tolerant landscaping practices when planting new or renovated streetscapes and street medians.
  - To the extent practicable, use biotechnical approaches to solving erosion or flood control problems.
  - Ensure that maintenance contractors are monitoring irrigation lines and watering times, particularly in the winter, such that residents do not observe overwatering and waste by the cities or the County.
  - Ensure sound stormwater management practices are implemented and maintained.
  - Reinforce responsible pet ownership and management by installing bag dispensers and trash receptacles at convenient locations along trails and parks and by redistributing educational materials prior to the rainy season.
- Implement key development requirements in the local plan approval process.
  - Add or amend CC&Rs or HOA Rules and Regulations to include educational materials and impose restrictions and penalties on residents to control household pollutants and limit actions that can adversely affect the community, as well as the watershed as a whole. For example, the HOA Rules

and Regulations could include educational material regarding the adverse effects of washing down driveways instead of sweeping. The rules could restrict this activity under specific circumstances and impose a penalty. Another example could be to distribute educational material regarding the adverse effects of trash and pet waste on the community as well as the downstream natural resources. The HOA Rules and Regulations could prohibit residents from littering in common areas, and require that they pick up waste from their pet, and dispose of trash and debris in provided trash receptacles. The HOA's justification for imposing these restrictions is that by disposing of trash and pet waste properly, the cleanliness of neighborhood schools, parks, and other common areas is protected, HOA fees are kept low, and the value of homes in the community is maintained.

- For new development, use only natives, native cultivars, or drought-tolerant landscaping for streetscapes, common areas, front yard planters, and buffer areas around parks.
- For new development, if sufficient reclaimed water sources are available, install reclaimed water irrigation systems for common areas, parks, and schools.

### ***Locations***

This strategy would target the entire Otay River watershed, but the types of materials and activities planned should be specific to the particular needs and issues of concern in the area (could be sub-basin or jurisdiction specific).

### ***Expected Proponents***

The County of San Diego's Project Clean Water program includes an Educational Technical Advisory Committee that coordinates activities between non-profit organizations, private institutions, and governmental agencies, which provide environmental and water quality education. Monthly meetings provide a forum for educators, trainers, and public information officers to collaborate, share methods and materials, and seek policy level support and direction. The County of San Diego MSCP also has an Outreach and Education component. Because of these programs, as well as the Watershed Management Plan Working Group, the County of San Diego is ideally suited to lead the effort of implementing this strategy in the Otay River watershed. If a Watershed Education interest group is formed, it should lead the development of watershed-specific educational materials, but it should coordinate closely with Project Clean Water and the MSCP to maximize efficiency in implementing the program. In addition, it is important that all the jurisdictions share in developing educational materials because they will ultimately be responsible for plan-checking new and renovated developments proposed within their jurisdictions for compliance with the Watershed Management Plan.

In addition to jurisdiction-based organizations within this watershed (e.g., City of Chula Vista Science Resource Teacher/Nature Center Liaison), it is recommended that the County seek partnerships with regulators and non-profit groups, such as the California Native Plant Society, the Audubon Society, and San Diego Stream Team to develop specific programs and field trips for the Otay River watershed. Several of these organizations have education programs, training, and materials available that can be utilized to initiate the program in the short term. The existing materials can also be used as templates for developing watershed-specific programs. For example, the California Coastal Commission and the State Water Resource Control Board have Education and Public Outreach Programs that include educational materials for businesses, teachers, and residents in subjects such as respecting living things, restoration, waves and watersheds, and sustainable living. The San Diego Stream Team trains volunteers on water quality monitoring techniques and indicator macrofauna. The San Diego Chapter of the California Native Plant Society completed demonstration gardens at five elementary schools in San Diego in 2004, donating plants and expertise to teach school children about native plants and planting techniques.

### ***Schedule***

Developing an interest group for Watershed Education could be completed at any one of the monthly Working Group meetings, and invitations to specific organizations such as the San Diego Chapter of the California Native Plant Society and the San Diego Stream Team can be sent immediately. The Project Clean Water or MSCP Outreach and Education websites have place holders for links to educational materials for teachers, students, residents, and businesses. These links could initially be filled with existing materials offered by other organizations as described above. Developing specific educational materials for the Otay River watershed to replace the regional versions and distributing them to residents could be completed in the short term (within 2 years). Organizing school presentations, tours and field trips, restoration or enhancement events, and other activities are likely short-term to intermediate-term activities (3-5 years). Over the long-term, the educational program would need to adapt as the watershed changes and as the Otay River Watershed Management Plan, the Special Area Management Plan, the MSCP, and other planning or regulatory efforts are implemented and updated.

### ***Maintenance and Monitoring Considerations***

The efficacy of this strategy will depend on how the residents and users embrace the educational materials and predicate in the watershed improvement projects. While it would be difficult to quantify, surveys of residents and users could gauge their attitudes about the watershed's resources and their role in reducing stressors. As with the other strategies, there are some uncertainties with what will be most effective, and the components of this strategy are likely to be updated over time. Feedback on the educational materials, the degree of participation in watershed improvement projects, the level of assistance in monitoring programs, and community surveys can all be useful in evaluating whether changes to the strategy are necessary.

### ***First-Order Cost***

There would be costs associated with developing educational materials (guidebooks, videos etc.), installing kiosks and waste receptacles at trail heads, conducting public outreach at schools, and organizing and coordinating field trips. These costs could collectively exceed \$100,000 over the short-term, depending on the level of effort, but volunteer labor and donated materials would likely reduce this estimate. Over the intermediate and long term, there would be additional costs to evaluate the progress of the programs and update them as needed.

### ***Potential Funding Sources***

Developing individual videos, pamphlets, and guidebooks are fairly low cost items, less than \$10,000 for each topic, particularly when "templates" from other organizations are utilized. Installing kiosks at trail heads is also considered a low-cost action (less than \$10,000). However, the long-term updating and reproduction of these materials and the maintenance of kiosks, gutter stenciling, etc. would be more costly and would need to be included in annual program costs. Because many of the topics are directly and indirectly related to improving water quality, proposition money could assist this effort, such as Propositions 40 and 50. In addition, there are multiple grants available for specific environmental education programs for schools and government agencies. The California Department of Education Environmental Education Grant Program provides mini-grants of up to \$3,000 to schools to help implement *A Child's Place in the Environment*. Grants funds up to \$10,000 are available for larger, district or county-wide projects. The California Coastal Commission's Whale Tail Grants Program distributes funds from sales of the Whale Tail License Plate. These grants support programs

that teach California's children and the general public to value and take action to improve the health of the State's marine and coastal resources. Adopt-A-Beach programs, as well as other beach maintenance and coastal habitat restoration projects that have an educational component, are also eligible for these California Coastal Commission grants.

There are specific grants and awards available for developing brochures and interpretative displays (e.g., The Conservation Fund and Eastman Kodak Company Kodak American Greenways Award Program), designing and coordinating community restoration groups (NOAA-Office of Habitat Conservation Community Based Restoration Program), as well as other environmental education and restoration activities (Wetlands Recovery Project Small Grants Program). There are numerous other funding opportunities under Proposition 40 and 40 and other bond moneys that require an educational component to every project.

### **B.1.I. Form a Watershed Council or Equivalent to Implement and Update the Watershed Management Plan**

#### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

#### **Goal 2. Ensure Reasonable, Sustainable, and Compatible Economic Development**

Objective A. Provide for housing, economic and community development, and public infrastructure that considers natural resources and water quality issues.

#### **Goal 5. Maximize Program and Plan Integration**

Action 1. Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.

Action 2. Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.

Action 3. Acknowledge the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego General Development Plans, Community Plans, and Specific Plans, as well as zoning ordinances where appropriate.

Objective B. Provide compliance with local, state, and federal agency requirements.

Action 2. Ensure that the Watershed Management Plan acknowledges the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego "Jurisdictional Urban Runoff Management Programs" (JURMPs) and Standard Urban Stormwater Mitigation Plan (SUSMPs).

Action 3. Identify existing protections and avoid any duplicative or conflicting recommendations or processes with the requirements of State and federal agencies, such as the CDFG, RWQCB, USFWS, and the U.S.

Army Corps of Engineers. A key example is the MSCP and the individual subarea plans.

### ***Activities and Benefits***

To maximize the implementation and utility of the ORWMP, it is imperative that a Watershed Council or similar oversight and decision-making body be established and remain in place over the long-term. An active and persisting entity is required to implement and update the Otay River Watershed Management Plan as-needed to best reflect stakeholder goals and objectives and to ensure strategies are effective in reducing impairments and protecting, enhancing, and restoring beneficial uses in this watershed. This body could be an extension of the Otay River Watershed Working Group, which includes representatives from each interest group (Environmental, Recreation, OVRP Citizens Advisory Committee, Regulatory, Property Owners and Business Owners), the Executive Steering Committee, or the Policy Committee. To be most effective, this body needs to include decision-makers from each jurisdiction, such as a County Supervisor and a council member from each city. The inclusion of elected officials representing each jurisdiction will be essential to ensure that the WMP strategies or updates are actually implemented. In some cases, changes could be significant enough that the governing body for each jurisdiction would have to collectively consider and decide on an issue. For example, additional funding will be required to update GIS databases and supporting documents, which could require action by the individual jurisdictions. In these cases, it is expected that follow-up meetings by the Watershed Council would be necessary to fully address these issues. Overall, this group would be responsible for (directly or through delegation):

- Prioritizing and implementing strategies
- Reviewing and updating goals, objectives, and actions as necessary to best reflect current interests
- Reviewing and updating GIS databases and supporting documents on watershed conditions
- Reviewing strategies implemented and not implemented to determine which should be retained, eliminated, or modified, as well as the reprioritizing strategies to be implemented
- Modifying strategies (including monitoring protocols and evaluation criteria) based on lessons learned or changing conditions
- Developing new strategies based on changing conditions and technology.

Over the long-term, at a minimum, this group should meet to formally update the WMP every 3 to 5 years. However, during the first several years, the group should meet more frequently (monthly, quarterly, semi-annually, annually) as necessary to maximize the implementation and effectiveness of strategies and to ensure the WMP best reflects stakeholder interests and the watershed conditions. Because watershed management is a complex enterprise and has regional effects, this body should interact regularly with equivalent bodies representing other San Diego region watersheds, as envisioned by Project Clean Water. This exchange of information would benefit all regional watershed management planning and implementation efforts through discussions of lessons learned and issues and resources of regional importance. Moreover, efforts could then be better coordinated for protecting and benefiting San Diego Bay, which is a regional resource.

### ***Locations***

The Otay River Watershed Council or equivalent body would be responsible for oversight and decision-making affecting the entire Otay River watershed. By coordinating with other regional Watershed

Councils, this Watershed Council would also contribute information and approaches that could benefit other regional watersheds.

### ***Expected Proponents***

As discussed, this body needs to include decision-makers from each jurisdiction, as well as the other interest groups participating in the Otay River Watershed Working Group (i.e., Environmental, Recreation, OVRP Citizens Advisory Committee, Regulatory, Property Owners and Business Owners). As with the participation of the County of San Diego, City of Chula Vista, City of Imperial Beach, City of San Diego, and Port of San Diego in the ORWMP, it is expected that the formation of the Watershed Council or equivalent would be formalized through a JEPA or similar agreement. This agreement should formally recognize the participation of elected officials in watershed matters.

### ***Schedule***

The Otay River Watershed Working Group, Executive Steering Committee, and Policy Committee are currently performing these functions in developing the Otay River Watershed Management Plan. However, a single Watershed Council or similar decision-making body should be formed by the release of the final Watershed Management Plan. This would help ensure there is not a delay between finalization of the initial WMP document and the implementation of strategies.

### ***Maintenance and Monitoring Considerations***

The composition of this body should be reexamined periodically to ensure it best reflects the current watershed interests and conditions. As needed, new representatives could be added to best reflect changing interests and conditions and to replace departed or departing representatives (e.g., elected officials). The participants could agree that jurisdictional representatives can change as the need arises, or a special meeting can be called prior to the next scheduled WMP review or update meeting to consider proposed changes in representatives.

### ***First-Order Cost***

Because this body would be a logical extension of the Working Group, the Executive Steering Committee, and the Policy Committee, it should not involve any extra cost beyond the time required to review materials and to convene and meet as a group. Therefore, this is a low-cost (less than \$10,000 in most years) strategy; although costs would be recurring, based on the frequency and length of meetings. Costs associated with updating databases, reports, and the WMP, including actual implementation, maintenance, and monitoring would be separate costs that are unknown at this time.

### ***Potential Funding Sources***

The jurisdictions have been funding their representatives to participate in the WMP-development process for the last few years. It is expected that the cost of updating the Watershed Management Plan and subsequently updating websites and producing revised copies would be shared among the jurisdictions as part of their implementation costs. As stated, it will be imperative that elected officials participate in this body, so a few more jurisdictional representatives might need to attend. Interest groups have been volunteering their time. It is expected that this involvement will continue. If

alternative funding sources are desired to fund formal involvement, the SDRWCB or SWRCB might be willing to provide monetary support.

## **B.2. MEDIUM-PRIORITY STRATEGIES FOR WATERSHED PROTECTION, ENHANCEMENT, RESTORATION, AND MANAGEMENT**

The following strategies, in no particular order, are considered medium priority for this watershed:

- Retrofit Existing Developments as Necessary to Protect Aquatic Resources
- Restore Urban Creeks
- Implement Comprehensive Agricultural Land BMPs to Protect Aquatic Resources
- Improve Existing and Create New Recreational Facilities
- Preserve, Enhance, Restore, and Manage Tecate Cypress Forest and Oak Woodlands

### **B.2.A Retrofit Existing Developments as Necessary to Protect Aquatic Resources**

#### *Target Goals, Objectives, Actions*

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

#### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective B. Protect natural landforms

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.

Action 5. Identify Best Management Practices to control erosion and contaminants at their sources to minimize aquatic resource degradation.

Action 6. Limit dry season runoff to seasonal wetlands such that plants and animals that depend on them will survive and the habitat types will not be converted to perennial habitats.

Objective D. Protect wildlife movement and dispersal corridors.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

#### **Goal 4. Ensure Public Health and Safety**

Objective A. Protect and enhance groundwater, surface water, and drinking water from sources of contamination, such as trash, debris, or other wastes entering waterways by storm runoff or illegal dumping.

Action 1. Identify areas of good and degraded water quality and design a plan to maintain or improve that quality.

Action 2. Provide sediment control while allowing for natural sand replenishment.

### ***Activities and Benefits***

This strategy involves evaluating the existing developments in the Otay River watershed to determine if any of them need to be retrofitted to protect and potentially enhance aquatic resources and beneficial uses. This strategy would require several steps:

- Retain water quality specialists, fluvial geomorphologists, and biologists to evaluate existing development in this watershed to determine where aquatic resources are adequately protected and where these resources could be better protected (modification of existing BMPs or addition of new BMPs).
- Prioritize which modifications/additions would result in the most protection or enhancement of aquatic resources.
- Contact and reach formal agreements with the developers/property owners/HOAs to make the modifications or additions (failure to reach agreement could require reprioritization of activities).
- Identify and secure all necessary funding to complete activities (i.e., applicable jurisdiction, the developer/property owner/HOA, grants, or combination; necessary funding, of course, includes money needed to retain experts to collect the initial baseline information and to complete all other listed steps).
- Complete BMP or project design and specifications.
- Complete environmental documentation (NEPA and CEQA) and obtain the required federal, State, and local permits.
- Hire contractors as necessary to implement the modifications or additions.
- Monitor the effectiveness of the retrofits.
- Perform as-needed BMP maintenance and modifications to protect and enhance beneficial uses.

Efforts should first focus on whether there are non-structural source controls that could be implemented, such as changes in land management practices. In most cases, however, some form of structural control would probably be required.

### ***Locations***

This action could be undertaken for any area of existing development in the watershed. Because the majority of open space and preserve areas, which are highly valuable and sensitive, occur north, east, and south of the Otay Reservoirs, efforts should be focused there initially. However, there may be important opportunities between the Otay Reservoirs and I-805 to protect against channel destabilization, adverse effects to water quality, and similar threats to beneficial uses associated with Otay Ranch, East Otay Mesa Business Park, and other developments currently under construction. These newer developments should have the most current BMPs in place, but monitoring along lower Salt Creek, as an example, might indicate that some retrofitting is warranted. Opportunities west of I-805 are probably more limited, given the heavy urbanization that has occurred and the lack of open areas for detention basins or similar features. Regardless, these developments should still be evaluated, particularly because of their proximity to San Diego Bay, which is an important and sensitive regional resource.

### ***Expected Proponents***

Each jurisdiction would be in the best position to determine initially which if any developments warrant retrofitting. However, because activities in one area would have consequences in other jurisdictions, it is recommended that the jurisdictions work collaboratively (e.g., through a JEPA) to prioritize retrofitting projects and the extent of retrofitting required. Appropriate prioritization will require the

participation of individuals with expertise in water quality and fluvial geomorphology. It is expected that the regulatory agencies, primarily the San Diego Regional Water Quality Control Board, would be supportive of this strategy.

### ***Schedule***

Retrofitting existing development is expected to be an intermediate- to long-term strategy. Some time will be required for the jurisdictions to agree on the most effective approach to prioritizing projects. In addition, it will take considerable time to work through the logistical issues with the developers/property owners/HOAs/residents, identify and secure necessary funding, prepare BMP or project plans and specifications, complete the environmental documentation, obtain the required local, State, and federal permits, and construct or modify the BMPs.

### ***Maintenance and Monitoring Considerations***

The jurisdictions will need to monitor the effectiveness of the implemented retrofits to determine whether additional retrofitting is required. Any new or modified features will need to be inspected and maintained to ensure continued functionality and protection of beneficial uses. It is expected that the flood control and/or stormwater departments of the respective jurisdictions would be responsible for maintaining these facilities over the long term.

### ***First-Order Cost***

This strategy is expected to cost several million dollars, depending on the number of projects, locations, retrofit types and sizes, and other factors. The cheapest “retrofits” would be changes in land management practices (i.e., non-structural source controls); but as noted above, some level of structural control would probably be required in most cases.

There will be significant costs associated with evaluating and prioritizing project candidates, reaching agreements with the developers/property owners/HOAs/residents, preparing construction plans, completing environmental documentation, obtaining permits, constructing the features, monitoring their effectiveness, and maintaining their functionality in perpetuity. Therefore, this is considered a high-cost strategy.

### ***Potential Funding Sources***

The jurisdictions could work collaboratively to fund the initial planning phase. Grant or bond money (Propositions 40 and 50) could fund many of the activities. In particular cases, the jurisdictions might be able to have the developers/property owners/HOAs pay for part or all of specific retrofits; if, for example, there were water quality standards they were required to meet and their existing facilities are inadequate. Other funding sources might become available to fund the long-term maintenance, but the jurisdictions might have to fund most of these on-going activities.

## **B.2.B RESTORE URBAN CREEKS**

### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

Goal 1. Protect, Enhance, and Restore Watershed Resources

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.

Action 4. Remove and prevent reinfestation of invasive plant and animal species.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

Objective F. Ensure no net loss of wetlands within the watershed.

#### Goal 4. Ensure Public Health and Safety

Objective B. Seek to restore the hydrology of drainage ditches, concrete channels, and stormwater pipes to natural to the greatest extent practicable.

#### Goal 5. Maximize Program and Plan Integration

Action 1 Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.

Action 2 Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.

Action 5. Coordinate restoration efforts within the watershed between public, private, and local landowner and managers be developed.

#### *Activities and Benefits*

This strategy focuses on identifying opportunities for urban creek restoration, primarily in the lower or western Otay River watershed (i.e., downstream of Savage Dam). As defined here, urban creeks are tributaries to the Otay River that have been altered by straightening, channel lining or filling, or culverting; typically to provide flood control or erosion protection to adjacent or nearby urban development. As such, the functional condition and societal value of many of these streams have been compromised. Moreover, these adverse effects can be translated downstream to the Otay River and San Diego Bay. While this strategy focuses on tributaries west of the Otay Reservoirs, suitable candidates could exist in the east and should be considered, as discussed below. Nevertheless, more urban alteration has occurred to the western tributaries and their condition is more likely to affect San Diego Bay (i.e., Savage Dam hydrologically disconnects the eastern and western watershed, except during extreme storms).

Urban creek restoration would be expected to provide numerous benefits, such as improvements in water quality, water quantity (additional flood water storage), wildlife support, aesthetic appreciation, and recreational enjoyment. While it is a worthwhile goal to restore as many urban stream reaches as possible, it is important to determine where restoration is feasible and beneficial to the ecosystem and to prioritize accordingly. As such, the following steps would be required to successfully implement this strategy:

- Retain fluvial geomorphologists, engineers, restoration ecologists, or similar experts to evaluate the feasibility of restoring tributaries (including logistics, technical aspects, costs) as well as the expected level of restoration benefits (including habitat area/stream miles restored, importance to wildlife, benefits to the quality of downstream receiving waters, aesthetic/recreation/other value to watershed users).
- Have experts prioritize the channels to restore considering the level of restoration that could occur at each, and restoration feasibility (including cost), schedule, and community input.
- Have experts determine restoration type (including the removal of flood control devices, lowering banks, expanding flood plain, planting with riparian and wetlands plants) and location (including stream reaches, bank invert, channel bottom, etc.).
- Contact and reach formal agreements with the property owners to determine which channels can be restored and the level of restoration achievable (note that unwilling property owners would require reprioritization of projects).
- Secure all necessary funding to restore the project channels (i.e., necessary funding, of course, includes money needed to retain experts to complete restoration feasibility studies and to complete all other listed steps).
- Conduct additional necessary hydrological and hydraulic studies.
- Prepare formal restoration plans, project design and specifications.
- Complete the required environmental documentation and secure the required federal, State, and local permits.
- Hire qualified contractors, as necessary, with experience in riparian restoration to complete the restoration activities (see maintenance and monitoring considerations, below).

### ***Locations***

As noted, most of the urbanized streams in this watershed occur west of Savage Dam, particularly west of I-805. In many cases, the proximity of infrastructure or development would preclude or limit stream restoration. In other cases, such as a culvert through a park, this logistical constraint might not exist or would be minor. What follows is an initial list of restoration project sites and actions for further consideration and evaluation:

- *Unnamed Tributary Through Loma Verde Park* – Opportunities for floodplain restoration exist on this tributary both upstream (approximately 900 linear feet to a residential culvert) and downstream (approximately 2,000 linear feet to Orange Avenue) of Max Avenue (Figure 22). Upstream of Max Avenue, activities could include minor grading along the southeast side of the channel to expand the active floodplain and terraces, enhance in-stream habitat and transitional and upland buffers through the removal of exotic vegetation (fan palm, castor bean, iceplant, tree of heaven, eucalyptus, pepper tree, annual grasses) and targeted planting of natives. Similar opportunities exist downstream of Max Avenue toward Orange Avenue, although ballfields currently limit restoration potential. Restoration opportunities between Orange Avenue and Main Street are severely diminished by the proximity of residential development and the culverting and filling of the historic tributary. In contrast, there appear to be opportunities for enhancement of the tributary downstream of Main Street to its confluence with the Otay River.
- *Nestor Channel* – Several opportunities currently exist for enhancing and restoring this tributary's floodplain and buffer area downstream and upstream of Coronado Avenue (Figure 23). Potential opportunities downstream of Coronado Avenue include: minor grading to expand the active floodplain and terrace along the west side, removal of exotics, and targeted native plantings along the reshaped bank and buffer (from Coronado Boulevard downstream to Cantamar Road, approximately 2,000 feet). From Cantamar Road to Dahlia Avenue (approximately 400 feet), there are opportunities to remove exotics, selectively plant natives along the banks, and limit in-stream mowing/channel clearing activities. There are similar floodplain and buffer restoration opportunities upstream of Coronado Avenue for a few hundred feet past the Hollister Street

crossing (approximately 2,000 feet). There might be some enhancement opportunities upstream toward I-5, but these actions appear to be well underway in the stream reaches through the Tesoro Grove Development.

- *Palm Avenue Tributaries Near Hanson Spancrete Operation*- These ephemeral drainages originate along the north side of Palm Avenue (just east of Hollister Street) and terminate at a retention/detention basin, upstream of a spec palm nursery and the Hanson Spancrete Pacific Gavel Processing Plant (Figure 24). This area is within the OVRP. If the Hanson operation and nursery can be relocated out of the Otay River, it might be possible to remove the retention/detention basin and reestablish through minor grading a stable channel cross-section and meander belt down to the Otay River. Follow-up removal of exotics and targeted native plantings would facilitate the restoration. If the Hanson operation and/or the nursery cannot be relocated, it might be possible to reestablish a channel; but it would have to be routed around these operations, which would diminish the functions and values of the restored channel.
- *Lower Poggi Canyon* – The lower part of Poggi Canyon has been impacted by channel fills, including placement of rock and concrete in the channel upstream of Main Street. This tributary drains an urbanizing area upstream, including Otay Ranch. One restoration candidate is the removal of the rock and debris, minor grading to reestablish a natural floodplain, removal of exotics, and targeted native plantings for approximately 400 feet upstream of Main Street. Upstream of this point, the stream is channelized in concrete and is surrounded by development, which limit the stream’s restoration feasibility and ecosystem benefits. There might be some potential for similar floodplain restoration actions downstream of Main Street to its confluence with the Otay River. At a minimum, exotics and debris could be removed and natives could be selectively planted. These activities would provide benefits to the restored channel reaches and help filter any contaminants flowing through them from upstream development.

#### Potential Upper Watershed Projects:

- *Thousand Trails Pio Pico Campground* – Several restoration activities could occur along Cedar Creek and Dulzura Creek through the 180-acre campground, also known as Pio Pico. Upstream of Otay Lakes Road, the floodplain of Cedar Creek could be restored by removing RV pads adjacent to the channel, removing in-stream rock riprap, regrading the floodplain fill areas to reestablish a more natural planform, planting native species, and removing invasive, non-native plants during the follow-up maintenance and monitoring period (Figure 25). Downstream of Otay Lakes Road, floodplain restoration could occur by replacing the multi-culverted dip crossing of Dulzura Creek with a railcar or similar span-type bridge, relocating the building structures outside of the floodplain on the north and south sides, removing minor fills and regrading the floodplain to a more stable planform, spot planting native species, and follow-up removal of invasive, non-native plants. Moreover, Otay Lakes Road tends to flood in the winter where Cedar Creek meets the road. A bridge could be constructed at this location to provide uninterrupted access and to remove a potential impediment to wildlife movement through this area.
- *Grazed Creek Restoration* – Several creeks in the upper watershed (e.g., including intermittent streams in the upper and central portions of Jamul Sub-Basin) are not “urban” creeks, as defined above, but they have been adversely affected by man’s activity through ecologically insensitive grazing practices (Figure 26). Many of these historically grazed creeks are in existing or planned preserves, and much of the grazing pressure has been removed. The channel and floodplain understory of many of these streams are beginning to recover. Activities that could assist this recovery include as-needed ripping/decompaction of the soil, minor grading to reestablish a more stable channel planform, replanting of native understory species, and follow-up invasive, non-native plant removal. As discussed in the *Otay River Watershed Special Area Management Plan Draft Planning Principles Report* (Jones and Stokes, 2005), similar restoration opportunities exist in Lee, Lyon, Jamul, and Hollenbeck Canyon Sub-Basins.

#### *Expected Proponents*

Each jurisdiction could undertake the evaluation of urban creek restoration opportunities within their boundaries, or they could collaborate (e.g., through a JEPA) to determine which would have the most benefits to the watershed, beyond their respective jurisdictional boundaries. It is also expected that

watershed residents would be very supportive of these efforts and could volunteer to assist in the restoration (e.g., such as planting of native species), follow-up maintenance (e.g., removal of exotic plants), and monitoring activities. The City of San Diego is currently undertaking the restoration of several tributaries of Chollas Creek, which could function as a successful regional model for urban creek restoration.

### ***Schedule***

Stream restoration, such as the examples provided above, could occur during the short- to intermediate-term. Such near-term successes could galvanize stakeholder and volunteer support for future projects. Larger restoration projects or those involving more effort (e.g., removal/relocation of infrastructure or significant grading) could take much longer. Evaluations of feasibility and prioritization would be followed by the logistical aspects of securing rights of way, funding, project design, environmental review, obtaining federal, State, and local permits, restoration implementation, and maintenance and monitoring of the habitat. Regulatory agencies typically require at least five years of maintenance and monitoring for authorized restoration projects.

### ***Maintenance and Monitoring Considerations***

The restored creek and associated habitats would require monitoring and maintenance to ensure it is successfully established and it is self-sustaining. Moreover, it is critical to ensure the restoration does not have adverse effects on downstream areas, such as unacceptable increases in sedimentation, flooding, or erosion of facilities. If such adverse effects are observed, it might be necessary to modify the restored habitat or affected areas downstream.

### ***First-Order Cost***

Costs for these restoration projects are expected to well exceed \$100,000 each, depending on many factors, including potential land acquisition, removal/relocation of infrastructure and flood control devices, the extent of excavation and contouring and disposal of fill, the extent of the habitat to be restored and the plant materials used, the environmental review and permitting requirements, and maintenance and monitoring. It is highly likely that grant or bond money would pay for many of these activities.

### ***Potential Funding Sources***

A variety of funding sources exist for these types of projects, in addition to jurisdiction funding, such as Propositions 40 and 50, grants from the Southern California Wetlands Recovery Project Work Plan and Small Grants Programs, funding from the California Coastal Conservancy or The Nature Conservancy, and supplemental RWQCB funds.

## **B.2.C Implement Comprehensive Agricultural Land Practices to Protect Aquatic Resources**

### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

Goal 1. Protect, Enhance, and Restore Watershed Resources

Objective B. Protect natural landforms

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

- Action 1. Provide a native buffer between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.
- Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.
- Action 5. Identify Best Management Practices to control erosion and contaminants at their sources to minimize aquatic resource degradation.
- Action 6. Limit dry season runoff to seasonal wetlands such that plants and animals that depend on them will survive and the habitat types will not be converted to perennial habitats.

Objective D. Protect wildlife movement and dispersal corridors.

- Action 1. Provide a native buffer (e.g., 100 feet) between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

### Goal 3. Provide Educational and Recreational Opportunities

Objective B. Implement an education program to promote stewardship of natural, cultural, and historical resources

- Action 3. Develop programs to educate residents about the importance of keeping pets and domestic animals properly controlled (e.g., vaccinated, kept indoors, leashed, in a fenced or confined area away from wildlife and streams and floodplains) and maintained (e.g., regular disposal of generated wastes at an appropriate upland location).
- Action 4. Conduct public education and outreach programs intended to prevent pollutants from entering stormwater runoff and reducing volume of runoff.

### Goal 4. Protect Public Health and Safety

Objective A. Protect and enhance groundwater, surface water, and drinking water from sources of contamination, such as trash, debris, or other wastes entering waterways by storm runoff or illegal dumping.

- Action 1. Identify areas of good and degraded water quality and design a plan to maintain or improve that quality.

- Action 2. Conduct public education and outreach programs intended to prevent pollutants from entering stormwater runoff and reducing volume of runoff.

**Goal 5. Maximize Program and Plan Integration**

- Action 1 Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.
- Action 2 Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.
- Action 3. Acknowledge the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego General Development Plans, Community Plans, and Specific Plans, as well as zoning ordinances where appropriate.

**Objective B. Provide compliance with local, state, and federal agency requirements.**

- Action 1. Adopt the Best Management Practices outlined in the City of San Diego “Source Water Protection Guidelines for new Development”.
- Action 2. Ensure that the Watershed Management Plan acknowledges the City of Chula Vista, City of San Diego, City of Imperial Beach, and the County of San Diego “Jurisdictional Urban Runoff Management Programs” (JURMPs) and Standard Urban Stormwater Mitigation Plan (SUSMPs).

***Activities and Benefits***

***Background on Agricultural Stressors***

Agricultural nonpoint source pollution enters receiving waters by direct runoff to surface waters or seepage to groundwater. The nonpoint source pollutants typically associated with agriculture are nutrients, pathogens, sediments, herbicides and pesticides. Runoff of nutrients can result from excessive application of fertilizers and animal waste to land, and from improper storage of animal waste. Farming activities can cause excessive erosion, which results in sediment entering receiving waters. Improper use and over-application of herbicides and pesticides can cause water column and sediment toxicity. Improper grazing management can cause erosion, loss of vegetation, soil compaction, and excessive nutrients, all of which impair sensitive areas. Over-application of irrigation water can cause runoff of sediments and pesticides to enter surface water or seep into groundwater. Sediment, pesticides, and excess nutrients all affect aquatic habitats by causing eutrophication, turbidity, temperature increases, toxicity, sanitary quality problems, and decreased dissolved oxygen.

***The Strategy in this Watershed***

The Otay River watershed has supported Western-style agriculture since non-native settlement of the region and the founding of the Missions in the 1500s. Historically, agricultural activities have not been very intense, characterized by free-range cattle and crop production. Agriculture on the Otay River watershed has declined in contemporary times, and livestock is generally limited to equestrian

‘ranchettes’ on the more rural eastern parts of the watershed. Based on field observations, livestock is usually corralled outside of streams, but there are instances where animals are kept within or immediately adjacent to streams. Currently, land use on approximately 1,744 acres (1.9 percent) of the watershed is characterized as agriculture. Agricultural activities are expected to remain at general existing scale and intensity in the foreseeable future. Because agricultural practices can directly and indirectly affect aquatic resources and there are simple sets of BMPs that can minimize adverse effects, this strategy focuses on developing several watershed-specific programs to address different agricultural operations.

There is a large, well-established suite of BMPs for the control of agricultural non-point source pollution. The SWRCB has identified seven specific measures for the control of agricultural non-point source pollution:

- Erosion and sediment control
- Non-CAFO Wastewater and Runoff Control
- Nutrient Management Programs
- Pesticide Management Programs
- Grazing Management Programs
- Irrigation Management Programs
- Education and Outreach

#### *Erosion and Sediment Control*

The purpose of erosion and sediment control measures is to prevent and reduce the amount of soil entering surface water. Strategies recommended for the control of rill and sheet erosion, streambank erosion, soil mass movement, and irrigation-induced erosion include:

- Leaving crop residues on the field, planting cover crops or other vegetative cover, and applying mulch to bare fields.
- Contour farming (i.e., grading fields to reduce slope length, steepness, or unsheltered distance), terraces, and/or diversions can be used to reduce slope length.
- Installation of cross-wind strips and hedgerows, trees, and shrubs along edges of fields or against prevailing winds to prevent wind erosion.
- Crop rotation (i.e., planting crops in a recurring sequence on the same field) and conservation tillage to improve soil properties and improve water infiltration.
- Installation of filter strips, field borders, fiber mats, and buffers to filter and trap sediment before it leaves the field.
- Installation of grassed waterways to prevent gullies and to filter and trap sediment.
- Installation of sediment ponds, basins, and traps to treat sediment-laden runoff.

#### *Non-CAFO Wastewater and Runoff Control*

Non-concentrated animal feeding operations (non-CAFO) are those that fall below the regulatory limits defined by the U.S. EPA (40 CFR Parts 9, 122, 123, and 412). Smaller animal feeding operations,

while not required to obtain a NPDES permit, must implement best management practices to contain wastewater and contaminated runoff from their operations. These BMPs include:

- Appropriately sized manure storage structures that store facility wastewater and contaminated runoff at all times, up to and including storms exceeding a 25-year, 24-hour frequency event.
- Protective cover from rainwater for dry manure.
- Development of a nutrient management plan, and land-apply manure and process wastewater in accordance with the plan.
- Diversion of clean water around feedlots and holding pens, animals, and manure storage facilities through the use of berms, diversions, roofs, or enclosures.
- Proper disposal of animal carcasses.
- Proper lining of waste lagoons with impermeable lining and installation of concrete pads for solid storage and animal traffic areas to prevent seepage of liquid wastes into groundwater and surface water.

#### *Nutrient Management Programs*

The development and implementation of a comprehensive nutrient management plan will reduce the nutrient loss from agricultural lands. A nutrient management plan entails a careful evaluation of field conditions and crop nutrient needs to establish a mix of nutrient sources and requirements for the crop based on realistic yield expectations. The fundamental basis of a nutrient management program is to apply nutrients as prescribed on the label with respect to timing and rate of application. The nutrient management program should also address proper maintenance, calibration, and operation of nutrient application equipment.

#### *Pesticide and Herbicide Management Programs*

The development and implementation of a comprehensive pesticide and herbicide management program will reduce or eliminate pesticide and herbicide runoff into surface water. The fundamental basis of a management program is to apply compounds as prescribed on the label with respect to timing and rate of chemical application. Integrated pest management can reduce the amount of chemicals required to manage pest damage. Pesticide and herbicide management programs also include good housekeeping measures to prevent spills, measures to protect surface waters from spills if they do happen, and proper maintenance of application equipment.

#### *Grazing Management Programs*

Grazing management programs protect sensitive areas such as streambanks, lakes, wetlands, estuaries, and riparian zones by reducing direct loadings of animal wastes and sediment. Grazing management can achieve this through several means, including:

- Carefully monitoring and manage grazing intensity, frequency, and duration.
- Installing fencing, hedgerows, or other measures to keep animals, people, and/or vehicles out of drainage courses and away from sensitive areas.
- Discouraging animals from seeking out streams by installing alternative drinking sources (e.g., water troughs) and providing shade and nutrients away from streams and sensitive areas.
- Providing stream crossings to minimize impacts on stream habitat and water quality.
- Providing improvements such as stabilized access roads, trails, and walkways that will help contain vehicular, foot, and animal traffic and limit damage to sensitive areas.

### *Irrigation Management Measures*

Irrigation management measures help ensure that irrigation water is applied in a manner that ensures efficient use and distribution of the water and minimizes runoff and soil erosion. An irrigation management plan comprises a careful evaluation of crop water needs and the hydrologic characteristics of the soil. Irrigation facilities should control the application and timing of irrigation to minimize water runoff and soil erosion.

### *Education and Outreach*

Education and outreach measures provide greater understanding of watersheds and increase the use of the agricultural standards and practices discussed here. Educational materials that have been developed to address the many agricultural activities and practices affecting non-point source pollution are widely available. Public education and outreach programs are most effective when they are tailored for the stakeholder group or audience they are designed to reach.

### *Locations*

Agricultural operations are concentrated in the less urbanized parts of the watershed; particularly east, north, and south of the Otay Reservoirs.

### *Expected Proponents*

Each jurisdiction should lead the implementation of these programs and measures on agricultural lands within their boundaries. Most of the agricultural land is in unincorporated area, so the County of San Diego would be instrumental in implementing this strategy.

### *Schedule*

This strategy is expected to be implemented within a short-term (2 years). Pamphlets could be prepared and distributed to agricultural owners (including ranchette owners) and lessees educating them about the adverse effects their activities can have and the simple BMPs they should use to protect aquatic resources. Periodic follow-up could help in reinforcing these concepts and educating new agricultural land owners/lessees over time.

### *Maintenance and Monitoring Considerations*

This strategy would be more effective if aquatic resources in and near agricultural lands are periodically monitored to document changes. For example, it is expected that keeping livestock away from aquatic features would benefit them, but the most effective distance is unknown and could vary by location within the watershed. Examination of infrared imagery and/or field monitoring at selected locations could allow customization of management practices to occur by location and agricultural use type.

### *First-Order Cost*

The preparation and distribution of informational pamphlets would be a lower-cost strategy (\$10,000 to less than \$100,000). Follow-up monitoring and customization of practices would increase the cost, depending on the level of monitoring (scope and duration) and customization desired.

### *Potential Funding Sources*

While the County and other participating jurisdictions could fund this effort, the Natural Resources Conservation Service (NRCS) might be able to assist in the implementation of this strategy. The NRCS typically has established relationships with the primary agricultural operators, which could increase implementation. The jurisdictions' agricultural departments or agricultural commissioners could provide this type of assistance as well. The NRCS might also be able to conduct BMP effectiveness monitoring. Other potential partners in this effort include universities and other research institutes interested in evaluating the effects of livestock on aquatic resources. Moreover, environmental groups and volunteers might be interested in participating in the education and monitoring efforts.

### **B.2.D Improve Existing and Create New Recreational Facilities within the Watershed**

#### *Target Goals, Objectives, Actions*

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

#### Goal 4. Provide Educational and Recreational Opportunities

##### Objective A. Provide for a multi-purpose trail system.

- Action 1. Coordinate appropriate and adequate public access points and staging areas to the open space for recreational users.
- Action 2. Maintain connectivity with other open space areas and trail systems.

##### Objective B. Implement an education program to promote stewardship of natural, cultural, and historical resources.

- Action 1. Educate trail users about leash laws and the adverse effects of litter and animal waste on wildlife and natural habitats.
- Action 2. Educate the community about the native flora and fauna.
- Action 3. Develop programs to educate residents about the importance of keeping pets and domestic animals properly controlled (e.g., vaccinated, kept indoors, leashed, in a fenced or confined area away from wildlife and streams and floodplains) and maintained (e.g., regular disposal of generated wastes at an appropriate upland location).
- Action 4. Conduct public education and outreach programs intended to prevent pollutants from entering stormwater runoff and reducing volume of runoff.
- Action 5. Establish stewardship programs (including volunteer coordination and community volunteer patrols) to manage and monitor natural resources and open space.
- Action 6. Educate residents adjacent to designated Open Space areas within the Otay River watershed about control and transfer of invasive plant species.

- Action 7.        Require trail users to clean up after themselves and their pets and impose penalties.
- Action 8.        Allow for additional recreational sites that avoid or minimize adverse effects on sensitive resources.
- Action 9.        Provide a native buffer between passive and active recreation trails and urban centers, such that hikers, birdwatchers, and eco-tourists are not disturbed while seeking the enjoyment of nature.

### ***Activities and Benefits***

The focus of this strategy is to protect sensitive resources while allowing the public access to open space for recreation. Planning guidelines are contained in the MSCP and associated Subarea Plans and several local planning documents, such as the Otay Ranch Resource Management Plan. Currently, safe, regularly maintained trails are limited in the Otay River watershed. However, there are multiple ongoing planning, maintenance, and land acquisition activities that are expected to implement this strategy with little additional effort as part of the ORWMP. The activities are primarily associated with the development of the Otay Valley Regional Park by the County of San Diego, City of Chula Vista, the City of San Diego, and Citizens Advisory Committee. As of December 2004, the joint powers had completed the *OVRP Concept Plan* (County of San Diego *et al.*, 1997), *OVRP Trail Guidelines* (County of San Diego *et al.*, 2003), and the *Draft Habitat Restoration Plan for the OVRP* (HDR Engineering, 2004). The OVRP is envisioned to consist of active and passive recreational facilities, a trail system with staging areas, view points, overlooks, and two interpretive centers for educational and environmental programs. The OVRP as envisioned would also provide for the protection of open space within the boundaries of the MSCP, and enhancement and restoration of natural resources.

The OVRP project boundary is contained within the river valley and floodplain running east and west, but will be a critical part of the regional trail network that extends from the Bayshore Bikeway (also known as the Silver Strand Bike Trail ) to the historic California Riding and Hiking trail at the eastern boundary of Lower Otay Lake (approximately 11 miles). The OVRP will also connect to, or influence the development of, existing and future trails including the Otay Mesa Residential Community to the south, the Chula Vista Greenbelt and the Otay Ranch Trail System to the north (connecting to the Sweetwater Reservoir and Sweetwater River Valley), and Eastlake and Otay Ranch trail systems to the northwest and northeast (Figure 27). Currently there are no official active or passive recreational areas in the OVRP other than the County-owned and operated facility at Otay Lakes. However, nature enthusiasts utilize abandoned dirt agriculture roads and utility easements in the western portion of the ORVP, between Interstate 5 and Interstate 805. These roads are rarely maintained and have no parking, staging, or other facilities available for public use. It is estimated that approximately 32 miles of dirt trails created by people traversing the OVRP and about 24 miles of unpaved utility maintenance roads and old farm roads currently exist. Trash and homeless encampment removal activities have been ongoing in this reach since 1999, as planned and executed by the OVRP Citizens Advisory Committee and volunteers.

As envisioned, the OVRP will ultimately include trails, staging areas, interpretive centers, and view points throughout 11 miles of the Otay River with linkages to schools, neighborhoods, and other open space areas within the watershed. Because of its location, scope, and goals, the OVRP really serves as the cornerstone for future recreational opportunities within the Otay River watershed; however, its regional significance relies heavily on the development and maintenance of trails and recreational facilities outside of the OVRP. Maximizing the regional benefits from all the ongoing efforts, will

require close coordination between the local jurisdictions and open space property owners and managers. The following is a partial list of opportunities within the Otay Watershed that would create a regional trail system. Many of these opportunities are currently being planned and several are overlapping geographically.

#### *The OVRP Trails, Staging, and Educational Facilities*

The OVRP has been divided into five distinct reaches; but each reach will have a combination of staging areas, interpretive centers, viewpoints/overlooks, and biking, horseback riding, and nature trails. The OVRP CAC is one of the six current Interest Groups assisting in the development of the ORWMP through the Working Group meetings. Because the OVRP and other recreation facilities will also serve as outdoor educational areas, this strategy would be most efficiently implemented by coordinating efforts between the CAC, the Watershed Education Interest Group (if formed), Project Clean Water, and the MSCP Outreach and Education groups. These groups could mutually benefit by providing recreational, educational, and volunteer opportunities to one another.

The following is a partial list of actions that could be implemented to ensure that the OVRP complies with the ORWMP:

- Ensure that the implementation of the OVRP complies with the *Source Water Protection Guidelines for New Development* (City of San Diego Water Department, 2004). Although these guidelines are specific to protecting drinking water quality, it is the most recent development of Best Management Practices for the County of San Diego.
- Identify existing sensitive species and habitats within the boundary of the OVRP.
- Ensure that the OVRP mitigates all impacts to sensitive resources through the restoration and enhancement within the Otay River Valley.
  - Seasonal trail closures may be necessary to protect sensitive breeding species in spring months.
- Design and implement a long-term monitoring program to assess the direct, indirect, and cumulative effects of new recreational facilities (trails, lighting, noise, trash, and debris).
- Coordinate design efforts with the Environmental and the Watershed Education Interest Groups of the ORWMP Working Group.
  - Design locations for outdoor classrooms where environmental programs can be administered to school groups and volunteers. An outdoor classroom should include a kiosk, a sitting area for up to 15 students, trash cans, doggie bag dispenser, and a drinking water fountain.
  - Prepare self-guided tour books so that residents can educate themselves regarding the resources in the OVRP.
  - Coordinate trash removal, enhancement, restoration, and tours within the OVRP to increase awareness and stewardship in the watershed.
- Provide doggie bag dispensers and trash cans every quarter mile along trails and at trail heads and staging areas.

#### *Coastal Bike Trail Connections between the OVRP, Bayshore Bikeway, and the Tijuana River Park*

One key element in connecting the OVRP to other trail systems will be to create an official linkage between the existing Bayshore Bikeway on Frontage Road, located north of the San Diego Bay, and the OVRP. Currently, access from the Otay River watershed is limited to an unofficial and unimproved path through an old agriculture property near the intersection of Frontage Road and Main Street, west of Interstate 5. The access road crosses Otay River via a culverted dip crossing that regularly floods.

The trail transitions into a paved bike path, maintained by the City of San Diego along their Saturn Boulevard easement. Saturn Boulevard is never expected to be completed in this area because it is within the San Diego National Wildlife Refuge. In addition, a bike trail would remain in this general location even if the Otay River floodplain is restored by the USFWS within the limits of the Refuge. The OVRP is planning a trail connection in this general area, but the details are unknown at this time.

The City of San Diego encompasses the southern boundary of the Otay River watershed, including portions of the Otay River Valley, the OVRP, and all of the Tijuana River Valley within the United States. The City maintains a paved bike trail from the Otay River along their Saturn Boulevard easement, as described previously, which continues south from the Refuge to Leon Avenue, turns on Hollister Street and again on Monument Road in the Tijuana River Park. Much of this trail is either a shared right-of-way with cars, unofficial paths, or absent from maps all together. The City also maintains the Bayshore Bikeway along Highway 75 from the City of Imperial Beach north into the City of Coronado. This path terminates at 13<sup>th</sup> Street, adjacent to the San Diego Bay Wildlife Refuge and the abandoned train tracks. The path transitions to roads along Palm Ave and then south to Saturn Boulevard, where it continues to the Tijuana River Park on the same unofficial path as described above; or trail users could transition north on Saturn Boulevard. Improvements to the coastal bike trail are currently being analyzed by SANDAG and the City of San Diego. A draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) is currently being prepared and will include an assessment of the impacts associated with connecting the Bayshore Bikeway with the bike path along Saturn Boulevard. This connection would likely be located through the railroad right-of-way through the San Diego Bay NWR near 13<sup>th</sup> Street. An optional route that follows the southern border of the San Diego Bay NWR is being evaluated to determine if it would reduce wildlife disturbance. This option would be located near Boundary Avenue in association with a future development (the Port property), south of Pond 20A.

It is unknown whether SANDAG is proposing improvements to Saturn Boulevard south of Leon Street or to Hollister Street in the same area. Improvement to one of these roads is important for a safe connection to Monument Road and the Tijuana River Park. The Tijuana River Park offers an extensive system of trails for hiking, biking, horseback riding, and educational opportunities, which are currently being formalized by the County of San Diego Department of Parks and Recreation (*Tijuana River Regional Park Trails and Habitat Enhancement Project*). The horse trails connect an equestrian staging area with the Pacific Ocean. Parking is available near the Visitor Center at 2310 Hollister Street. Pullouts for trailers, corrals, and picnic tables are all also available. The trails also have linkages to new baseball facilities and a new Bird and Butterfly Garden, also west of the Visitor Center. In addition, a Community Garden at the intersection of Hollister Street and Sunset Avenue provides residents a place to exercise their green thumbs.

#### *The City of Chula Vista Greenbelt within the Otay River Watershed*

The City of Chula Vista Greenbelt is envisioned as a 28-mile continuous open space and park system and trails that encircle the City (Figure 27). The Greenbelt includes the OVRP, the Sweetwater River Park, the San Diego Bayfront Redevelopment Project, and the Eastlake and Otay Ranch Trail Systems creating a regional loop system. The Greenbelt is a continuation of trails within the OVRP, extending north along Salt Creek connecting the proposed University area and Mother Miguel Mountain and westward into Sweetwater Reservoir and Regional Park. Existing trails through the Sweetwater Regional Park extend from the Reservoir at the east end down to the San Diego Bay. The City is planning a redevelopment project for 550 acres on San Diego Bay, including open space surrounding the Sweetwater Marsh and improved access to the Chula Vista Nature Center. The trail system is

planned to traverse the bayfront redevelopment area south towards Otay River, connecting back with the OVRP and the Bayshore Bikeway. The Greenbelt Master Plan was adopted by the City of Chula Vista on September 16, 2003, and it provides goals and policies, trail design standards, and implementation tools that guide the creation of the Greenbelt system of multi-use trails through open space corridors. It is important that the implementation of the Greenbelt Master Plan for the City of Chula Vista, the OVRP, and the ORWMP are closely coordinated so efforts are not duplicated and natural resources are not adversely compromised.

#### *The California Riding and Hiking Trail*

The California Riding and Hiking Trail begins at Savage Dam of Lower Otay Lake and extends along the south side of the Lake and then east past the County Park north along Otay Lakes Road. This trail has been in place for 50 years and is shown as an existing County Trail (Figure 27). Maintenance and management of the trail was active, but coordinated efforts are currently lacking. From the historic trail map, it appears that the trail is actually Daley Ranch Truck Trail and traverses the Hollenbeck Canyon Wildlife Area. Part of the trail is now Otay Lakes Road. The County of San Diego is planning to replace this reach of trail, but details are unknown at this time. The trail is advertised for mountain bikes, horses, and hiking from Lower Otay Lakes to McGinty Mountain and into the Cleveland National Forest. The City of Chula Vista and communities in this watershed and the Sweetwater River watershed are proposing linkages to this trail. Given its regional importance, links to the OVRP, and the sensitivity of surrounding resources, implementation of this strategy should coordinate the reconnection of portions of the trail that were replaced by roads, ensure that new facilities and linkages minimize adverse effects, prepare an environmentally sensitive maintenance and management plan, and ensure that trail users are educated about the surrounding sensitive resources and wildlife (e.g., kiosks, trail markers, signs).

#### *Inland Otay Lakes and Tijuana River Connection*

At this time, there are no inland linkages between the OVRP and the Tijuana River Park. A County trail is shown from the Otay River Valley, heading southeast partially up Johnson Canyon. A connection could be made via Otay Mesa Road near Dennery Canyon. Otay Mesa Road turns into East Beyer and then Camino De La Plaza in the Tijuana River Valley. Creating this linkage would require joint planning and agreement between the County of San Diego, the City of San Diego, and private property owners. Alternatively, a larger culvert could be installed underneath Otay Mesa Road to connect Dennery Canyon and Spring Canyon. Data indicate that the existing culvert is used by coyotes and small mountain lions. A larger culvert could accommodate passage by trail users and enhance wildlife movement, which would also assist the implementation of the high-priority strategy: Maintain, Enhance, and Restore Habitat Linkages and Wildlife Movement

#### *Additional Recreation Opportunities on Public and Private Lands*

In addition to coordinating efforts among local jurisdictions, the recreational trail system should connect with the various open space lands in the watershed (subject to their management directives, of course), including BLM Otay Mountain Wilderness Area, the San Diego Bay NWR, the CDFG Rancho Jamul Ecological Reserve and Hollenbeck Canyon Wildlife Area, and the Cleveland National Forest. The BLM Otay Mountain Wilderness Area currently has no recreational facilities; however, the Otay Truck Trail and the Minnewawa Truck Trail are open to hiking, biking, and horseback riding. BLM plans to prepare a management plan in the next 5 years for the Wilderness Area as well as other land holdings in

the Otay River watershed and southern San Diego County. Coordination between the ORWMP Working Group, the OVRP CAC, and BLM through their development of the management plan could maximize recreation opportunities on these properties.

Trails for passive and active recreation also exist within the CDFG Hollenbeck Canyon Wildlife Area, located approximately 5 miles east of Jamul and northeast of Lower Otay Lake and accessible via State Highway 94 (Campo Road). The 3,200-acre wildlife area provides a wildlife corridor between Otay Mountain and the Jamul Mountains. The CDFG is currently preparing a Land Management Plan expected to be completed in December 2006. Coordination between the ORWMP Working Group, the OVRP CAC, and CDFG through the development of their Land Management Plan could maximize recreation opportunities and linkages between these existing trails and the proposed OVRP and Chula Vista Greenbelt.

### ***Locations***

The entire watershed would be targeted by this strategy, to maximize connections with other recreational facilities, but the majority of the activities would likely take place in the western portion of the watershed, between the Heritage Road and the San Diego Bay within the boundary of the OVRP.

### ***Expected Proponents***

The County of San Diego is ideally suited to lead the effort on implementing this strategy through the development of the Otay Valley Regional Park in coordination with the Cities of San Diego, Chula Vista, Imperial Beach, and the CAC. The CAC could be charged with ensuring that the OVRP complies with the natural resource-protection aspects of the ORWMP through close coordination with the Environmental and Watershed Education interest groups of the ORWMP Working Group. The CAC should also be in close coordination with Project Clean Water and the MSCP Outreach and Education programs as they have overlapping interests.

### ***Schedule***

Development of the Otay Valley Regional Park is ongoing. Land acquisition or acquiring easements for private properties within the OVRP could be a lengthy process. Scheduling regular coordination meetings between the CAC, Project Clean Water, and the Environmental and Watershed Education Interest Groups of the ORWMP Working Group could be completed immediately. Developing the OVRP is likely an intermediate action (3-5 years) to a long-term (more than 5 years) action depending on the location of proposed trails and the adjacent sensitive resources. Monitoring the effects of the OVRP on the natural resources and beneficial uses of the watershed is a long-term effort (more than 5 years).

### ***Maintenance and Monitoring Considerations***

There will be significant long-term maintenance and monitoring activities associated with implementing the OVRP or any other public recreational facility. Trash cans and doggie bag dispensers would likely need to be emptied and refilled on a weekly basis. Kiosks and trail guides would likely need to be monitored and repaired on a quarterly basis. Fencing, lighting, and other safety measures would also need to be monitored on a quarterly basis, but no longer than a bi-annual basis. Trash and homeless camp removal within the OVRP should occur at least once per year.

Monitoring the compliance of the development of recreational facilities on the natural resources and beneficial uses would be a long-term program. There is little regional information about the effects of light, noise, and pedestrians in close proximity to sensitive species while breeding and foraging or on general wildlife movement. There are also likely to be effects on water quality associated with trails and soil compaction, litter and pet waste, and regular trimming of trees and removing understory debris adjacent to trails. All of these potential impacts need to be considered when developing a long-term monitoring and maintenance program. The program must also be flexible to changes that occur in the watershed and in the regulatory environment.

#### ***First-Order Cost***

The development of the trails, staging areas, and other facilities associated with the OVRP will be several million dollars. Maintaining and monitoring the OVRP facilities would likely be more than \$100,000, but less than \$1 million, on an annual basis.

#### ***Potential Funding Sources***

There are numerous grants that are designed specifically for recreation, and others for maintenance and monitoring. Planning and developing trail facilities can be funded by California Department of Parks and Recreation through the Habitat Conservation Fund, the Land and Water Conservation Fund Program, and the Recreational Trails Program. The outdoor classroom facilities could qualify as environmental youth service centers and be funded by the Murray-Hayden Urban Parks and Youth Services Program. Kiosks and other interpretive facilities (sign posts, self-guided tour markings, etc.) could be funded by the Per Capita Grant Program, The Eastman Kodak Company Kodak American Greenways Award Program. Designing activities and coordinating community restoration groups can be funded by NOAA-Office of Habitat Conservation Community Based Restoration Program and Wetlands Recovery Project Small Grants Program. There are also programs to maintain trails and greenways, such as the Rivers, Trails & Conservation Assistance Program through the National Parks Service. Finally, because many of the monitoring, enhancement, and restoration activities associated with the OVRP are directly and indirectly related to improving water quality, Propositions 40 and 50 could be a large contributor to the long-term effectiveness of this strategy.

### **B.2.E Preserve, Enhance, Restore, and Manage Tecate Cypress Forest and Oak Woodlands**

#### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

##### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective A. Preserve additional open space.

Objective B. Protect natural landforms

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

Action 1. Provide a native buffer between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

- Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.
- Action 3. Manage groundwater use so that groundwater is maintained at levels that provide for a historic level of interflow, sufficient to support native habitat and wildlife.
- Action 4. Remove and prevent reinfestation of invasive plant and animal species, working from upstream to downstream habitats.
- Action 6. Limit dry season runoff to seasonal wetlands such that plants and animals that depend on them will survive and the habitat types will not be converted to perennial habitats or other type conversions.
- Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.
- Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

#### Goal 5. Maximize Program and Plan Integration

- Action 1. Identify gaps and conflicts between the existing plans within the watershed and the goals and objectives of the Watershed Management Plan.
- Action 2. Identify strategies for filling the gaps and/or recommendations for changes in the existing plans can be developed.
- Action 7. Coordinate restoration efforts within the watershed between public, private, and local landowner and managers.

#### ***Activities and Benefits***

This strategy is intended to help facilitate the preservation, enhancement or restoration, and management of Tecate cypress (*Cupressus forbesii*) forest and oak woodlands and their associated resources (e.g., the Thorne's hairstreak butterfly) in the Otay River watershed. The MSCP and other preserves are protecting or will protect large areas of Tecate cypress forest and oak woodland (Figure 28). Considering existing and planned preserves, 100 percent of the Tecate cypress forest will be protected (97 percent existing preserves, 3 percent planned preserves), while the protection for oak woodlands is much lower (just under 24 percent in existing preserves, and 26 percent in the County's Pre-Approved Mitigation Areas).

The majority of the Tecate cypress forest in Otay River watershed occurs within the BLM Otay Mountain Wilderness Area and will not be impacted by future developments. Also, the Tecate cypress is an MSCP-covered species. While the species is nearly 100 percent preserved in this watershed, a management plan has not been developed to ensure its long-term persistence and health. However, an ongoing monitoring program by the U.S. Fish and Wildlife Service includes surveys for the Thorne's hairstreak, a butterfly directly associated with Tecate cypress. Careful management of Tecate cypress is particularly important at this time because this species is sensitive to fire frequency. Fire facilitates the propagation of this species by opening its cones and releasing seed. However, sufficient time

(approximately 40 years, according to Esser, 1994) is required between fires to produce a sufficient cone crop; otherwise, the community can be exterminated. The fires of 1996 and 2003 affected the majority of the Tecate cypress in this watershed, and additional fires in the next 40 years could be devastating to this species.

There is some state-wide oak-specific protection. If development would affect oak woodland, mitigation might be required under the California Environmental Quality Act (CEQA), as specified in Section 21083.4 of the Public Resources Code (Conversion of Oak Woodlands). However, judgments of significance and appropriate mitigation can vary greatly depending on the county agency involved. The Oak Woodlands Conservation Act, Senate Bill 1334 (formerly SB 711) will protect California's remaining oak forests. Senate Bill 1334 requires counties to include provisions for replacing oaks or restoring oak habitat, unless oak protection is covered elsewhere (e.g., through Habitat Conservation Plans). The bill provides several ways this might be accomplished, including restoration of oak woodlands, purchasing conservation easements, or contribution to the Oak Woodlands Conservation Fund. The nexus for this bill to take effect is through CEQA.

Protection of oak woodlands really falls to county and city governments, with several (e.g., Riverside and Los Angeles Counties) developing oak tree ordinances. None of the jurisdictions within the Otay River watershed have specific oak tree or oak protection ordinances. The County covers oaks in combination with riparian oak woodlands through their Resources Protection Ordinance (RPO), and all jurisdictions include this vegetation type in their MSCP Subarea Plans. However, vast areas of oak woodlands and individual oaks fall outside of the MSCP's Multi-Habitat Planning Area (MHPA) boundaries and other preserves. Individual oaks are not specifically covered by the MSCP with the exception of Engelman Oak (*Quercus engelmannii*), which are covered by the North County MSCP. However, it is also expected that oaks will be covered under the County's East County MSCP, which is currently being prepared.

This strategy, if implemented, could aid in closing these gaps in Tecate cypress forest management and oak tree protection and management. What follows is a brief description of these communities as well as approaches to conserving and enhancing or restoring them:

#### *Tecate Cypress*

The Tecate cypress is a small evergreen tree with forked trunks and irregular, spreading crowns (Stuart and Sawyer, 2001). Trees are typically less than 9 meters tall. The bark exfoliates exposing mottled inner bark that is often cherry red. This is a rare cypress that is known from coastal chaparral communities in the Santa Ana Mountains in Orange County south into Baja California. Tecate cypress is a CNPS List 1B species and is considered rare. The most extensive population known to date is within the BLM's Otay Mountain Wilderness Area. This species appears to be restricted to elevations between 300 to 2,500 meters. It is adapted to fire with serotinous seed cones that open after a fire. As noted, Tecate cypress are vulnerable to fire frequency because this species requires approximately 40 years to produce a sufficient cone crop. This species grows quickly in the first few years and is often planted in well-drained soil as wind breaks.

The Thorne's hairstreak butterfly (*Callophrys thornei*) is a federal Species of Special Concern known only from five populations within the San Ysidro Mountains (also known as the Otay Mountains). The species is dependent on the Tecate cypress as its host plant. This species, formally a candidate or proposed for federal listing on the endangered species list, holds no federal status, but is a covered species under the MSCP. Approximately 56 percent of the Tecate cypress forest burned in 2003, causing this species to be vulnerable to extinction (Center for Biological Diversity, 2005). According to

California Department of Forestry and U.S. Forest Service records, approximately 58 fires have burned through and near Tecate cypress forest on Otay Mountain over the last century. This number greatly exceeds pre-European settlement fire frequency in southern California chaparral ecosystems. Because of the frequent burns, a fire management plan is critical for the survival of both the Tecate cypress forest and this species of butterfly.

Other wildlife that are potentially dependent on the Tecate cypress include rodents and deer, which feed on cypress seedlings, and the San Diego coast horned lizard, for which Tecate cypress forest is considered prime habitat.

The following items could be implemented to help facilitate the protection and management of the Tecate cypress forest:

- Retain qualified biologists to conduct a detailed survey of the remaining Tecate cypress forest within the Otay River watershed and the likely historic distribution (including mapping the entire vegetation community and individual trees by size, quality, and location). The majority of this community is within the BLM's Otay Mountain Wilderness Area.
- Assist BLM in developing a management plan for the Tecate cypress forest. Key management objectives should include the following:
  - Develop fire management strategies and protocols to limit human-induced fires.
  - Determine if restoration actions are necessary. These could include collecting viable cones, propagating them in a nursery, and transplanting in recently or historically occupied areas.
  - Develop strict guidelines for recreational activities, particularly off-road vehicle and camping use that could create a fire hazard.
  - Develop education materials for local residents and wilderness users regarding this critical habitat community.
  - Improve coordination between the U.S. Border Patrol and BLM to restrict access and improve response time for human-induced fires.

### *Oaks*

Two oak trees are of primary concern for conservation. These are the coast live oak (*Quercus agrifolia*) and the Engelmann oak (*Quercus engelmannii*). The coast live oak occurs in woodlands with grassland, sage scrub, and to a lesser extent, in chaparrals, from Mendocino County to Baja California, Mexico. These trees require deep, well-drained soils, often on lower slopes in riparian areas and are shade tolerant. This species can live more than 250 years and is fire resistant due to its thick bark and sprouting ability. Engelmann oak is restricted in range to coastal southern California south to Baja California, Mexico. This species is a CNPS List 2 species due to its limited distribution and proximity to growing urban centers (Dunning *et al.*, 2002). This species grows in woodlands on dry foothill slopes and mesas in well-drained soil, but is also often found in clay soils. Engelmann oaks can live at least 350 years old, but are less fire tolerant than coast live oaks. Coast live oak and Engelmann oak are often found growing in woodlands together in San Diego County.

Oak woodlands historically occurred with native bunch grassland and coastal sage scrub, presumably because of the open ground spaces between the perennial bunch grasses and shrubs, as well as the slow growing and non-competitive nature of these communities (McCreary, 2001). Although it is widely thought that oak woodland in southern California is relatively abundant and stable, problems with reproduction in both the coast live oak and the Engelmann oak is apparent (Sierra Club 2005; Camping *et al.*, 2002). This is most likely due to the loss of native bunchgrass and overgrazing by cattle, which

compacts soil, lowers soil quality and fertility (Camping *et al.*, 2002), increases competition with annual grasses for resources, and allows for consumption of oak seedlings. There is great concern that natural regeneration of oak woodlands is not sufficient to sustain populations. This concern could also be true for mature oak woodlands proposed for preservation within the Multi-Habitat Planning Area; without long-term management, the community could slowly convert to annual grassland.

The following steps should be implemented by the County of San Diego (and other jurisdictions, if appropriate) to help facilitate the protection and management of oak woodlands:

- Retain qualified biologists to conduct a detailed mapping study of the remaining oak woodlands within the Otay River watershed. Identify the historic extent of oak woodlands and the current distribution within the existing and planned preserves.
- Coordinate with regional oak tree experts to determine whether or not the MSCP and other preserve areas adequately preserve oak woodlands. If the 50 percent estimate of existing and planned protection is accurate and determined to be an adequate level of conservation for this watershed, the preservation aspect of this strategy may have already been met.
  - If 50 percent of the existing oak woodland is determined not to be adequate, additional areas for preservation should be identified and possibly purchased for inclusion in the MSCP or other preserve areas in this watershed.
  - If 50 percent is determined not to be adequate, the County of San Diego (and other jurisdictions, if appropriate) should work towards developing an oak tree ordinance that limits and mitigates impacts to trees and woodlands outside of the MSCP and other preserves in this watershed.
  - If 50 percent is determined to be adequate, the focus of the strategy should be on developing an oak tree monitoring, management, and restoration plan for the MSCP and other preserves areas.
- Develop a monitoring program for oak woodlands within the MSCP and other preserve areas.
  - Determine if oaks within the MSCP and other preserve areas are reproducing following the removal of disturbance activities such as ranching and grazing. Natural regeneration of the community is critical to the long-term persistence and health of the woodland being preserved.
  - The monitoring project should answer the following questions at a minimum:
    - Are oak seedlings and saplings present?
    - Is there age structure within the community or are all the oak trees over 100 years old? Limited age structure would indicate that there has been little propagation since the time settlers began removing native grassland, sage scrub, chaparral, and oak woodlands for grazing and other activities.
    - Are acorns viable or are they compromised by insects or disease?
  - What species occur in the understory of the oak woodlands? Removing annual grassland and restoring native grassland would likely help to increase oak regeneration by restoring soil quality and fertility and decreasing soil compaction and species competition. Also, because oak woodlands in the watershed are often associated with perennial streams and tributaries, surface water volume and quality may also be an issue in maintaining quality and quantity of riparian oak woodlands.
- Prepare a restoration program for areas that lack regeneration or areas of historic occupancy. Suitable restoration candidates could occur in preserved areas that were formerly in ranching or agriculture. The following is a short and incomplete summary of restoration steps necessary for oak woodland restoration taken from *Small-Scale Planting of Engelmann Oak Trees* (St. John and Scott, 1997).
  - Site preparation: The soil should be moist from winter rain at the time of planting. If winter rain is not available (i.e., drought year), artificial watering to a depth of two or three feet could be used.

- Planting techniques: Planting must occur during the fall or winter when the soil is wet and cool. If planting is to occur more than a few feet from an established oak tree canopy, a tablespoon or so of soil should be obtained from below an established oak and added below each acorn when planting. Each acorn should be placed in a shallow depression and covered with two inches of soil.
- Protect the oak seedlings from herbivores and direct sunlight by enclosing them in a cylinder of aluminum window screen, ¼” hardware cloth, or ½” poultry netting. Bury the cylinder six inches below the ground and extend one foot above ground.
- Do not install irrigation and do not fertilize.
- Development of an oak tree ordinance should begin with the review of existing similar ordinances in California. It will be critical to evaluate what has been effective in protecting oaks in developing a comprehensive set of regulations that balances economic growth with oak tree preservation. The ordinance should address the following at a minimum:
  - Inventory methods for property owners to record oak tree occurrences, size, age, and quality.
  - Minimum buffer areas for avoidance and preservation of individual oaks.
  - Required mitigation measures for different levels of impacts (direct or indirect).
  - Management measures for trees or clusters of trees or the entire oak woodland vegetation community.

### ***Locations***

The locations of Tecate cypress and oak communities are shown in Figure 28. It should be noted, however, that these data are part of a 1993 regional data set used in developing the MSCP; so they might not be comprehensive or completely accurate. According to these data, all of the Tecate cypress forest in this watershed occurs in the Otay Valley East, Savage, and Hollenbeck subbasins. Oak woodlands occur in Proctor Valley, Jamul, Lee, Lyon, Hollenbeck, and Engineer Springs subbasins.

### ***Expected Proponents***

According to the vegetation map, the Tecate cypress forest and oak woodland occur entirely within County jurisdiction. If this is accurate, the County of San Diego would be the most appropriate lead for protecting and managing these communities. If either occurs within city jurisdiction or within an area that could be incorporated, it would be beneficial for that jurisdiction to be involved as well. For the Tecate cypress forest, the County should coordinate closely with BLM, given that this community is mostly in the Otay Mountain Wilderness Area. Also, the County should develop a specific oak tree ordinance to protect individual oaks from complete and unregulated removal outside of the MSCP and other preserve areas. Moreover, the County should work in cooperation with open space landowners, such as the BLM, CDFG, USFWS, and private preserve owners within the watershed, to ensure that Tecate cypress and oaks are adequately protected and managed.

### ***Schedule***

The County of San Diego and other MSCP participants have been acquiring and preserving lands that support Tecate cypress forest and oak woodlands. Developing a short-term monitoring protocol to determine the health of the communities preserved can begin immediately following land acquisition. Development and implementation of a long-term management, monitoring, and restoration program for the Tecate cypress forest and oak woodlands within the MSCP and other preserve areas would be a long-term endeavor. The BLM anticipates completing such a plan for Tecate cypress in the next five years. Given the recent fires and the risk to this species from additional fires, the County should work with the BLM as soon as possible to develop and implement this plan.

A large percentage of the oak woodlands on this watershed occurs outside of existing and planned preserves. Continued development within the eastern or upper watershed could have direct and indirect effects on this community; although low-density development is planned in these areas. While the low-density development could avoid the direct impacts and many of the indirect impacts to oak woodlands, there is no regulatory tool (except for compliance with CEQA) to monitor the impacts, impose mitigation, or monitor the success of avoidance and mitigation measures. A County oak tree ordinance could fill this gap and ensure appropriate mitigation occurs for impacts to this community outside of the MSCP and other preserve areas. Development and implementation of an oak tree ordinance could be a short-, intermediate-, or long-term activity, depending on the level of controversy. A similar effort to develop a County oak tree ordinance in the 1970s was unsuccessful (Tom Oberbauer, personal communication).

### *Maintenance and Monitoring Considerations*

Regular monitoring would be required to evaluate the effectiveness of the Tecate cypress forest and oak woodlands management, restoration, and monitoring programs within the preserve areas; as well as the efficacy of the oak tree ordinance in protecting oak woodlands outside of the MSCP and other preserve areas. Monitoring would show whether changes should be made in either program to maximize protection and restoration.

### *First-Order Cost*

Administrative costs associated with assisting the BLM in assessing the status of the Tecate cypress forest and in developing a management plan for the community would likely be on the order of \$100,000, assuming it takes 5 years to develop a program. Costs for acquiring additional lands (to protect oak woodlands) outside the MSCP and other preserve areas could be millions of dollars. Instituting a detailed vegetation mapping and quality assessment of the oak woodlands within the Otay River watershed would probably range from \$50,000-\$100,000. Costs associated with enhancement or restoration activities and follow-up maintenance and monitoring of oak woodlands within the MSCP and other preserve areas would probably range from \$50,000-\$75,000 per acre.

### *Potential Funding Sources*

There are many sources of funding available to acquire properties. Grant (e.g., The Conservation Fund's American Land Conservation) and bond money (Propositions 40 and 50) are available. Also, Counties may use a grant awarded pursuant to the Oak Woodlands Conservation Act (Article 3.5 (commencing with Section 1360) of Chapter 4 of Division 2 of the Fish and Game Code)) to prepare an oak conservation element for a General Plan, an oak protection ordinance, or an oak woodlands management plan. In the case of the Otay River watershed, if an oak tree ordinance is instituted, mitigation monies could be used to purchase habitat outside of the MSCP and other preserve areas.

### **B.3. LOW-PRIORITY STRATEGIES FOR WATERSHED PROTECTION, ENHANCEMENT, RESTORATION, AND MANAGEMENT**

The following strategies, in no particular order, are considered low priority for this watershed:

- Preserve, Enhance, and Restore Additional Parcels in the Otay River Floodplain
- Protect, Enhance, and Restore Cultural Resources

#### **B.3.A Preserve, Enhance, and Restore Additional Parcels Within the Otay River Floodplain**

##### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goals, objectives, and actions of the ORWMP:

##### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective A. Preserve additional open space.

Objective B. Protect natural landforms

Objective C. Conserve, enhance, and restore functions and values of native habitats and aquatic resources.

Action 1. Provide a native buffer between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

Action 2. Protect groundwater and surface water from contaminants and levels of extraction that would degrade the support of native habitat and wildlife.

Action 4. Remove and prevent reinfestation of invasive plant and animal species.

Objective D. Protect wildlife movement and dispersal corridors.

Action 1. Provide a native buffer (e.g., 100 feet) between key habitat areas and active recreation trails or urban centers, such that noise, light, and traffic do not impact wildlife.

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

Objective F. Ensure no net loss of wetlands within the watershed.

##### **Goal 4. Protect Public Health and Safety**

Objective C. Provide flood management.

Objective D. Preserve the water absorption capacity of the watershed so that natural flow-capacity of waterways is not exceeded during storms.

Objective E. Preclude development within the Otay River floodplain.

### *Activities and Benefits*

This strategy is intended to capitalize on opportunities to purchase or secure conservation easements over floodplain parcels in the Otay River watershed, in addition to any parcel purchases or interests obtained as part of implementing the other strategies presented in this document. Land or property interest acquisition is expensive, particularly in the coastal areas of southern California. Enhancing or restoring natural resources on these parcels or demolishing structures or infrastructure would increase this cost. These activities might also require coordination with FEMA for a LOMR/CLOMR, in addition to other federal, State, and local approvals (similar to the high-priority strategy: Restore the Lower Otay River Floodplain to Enhance the Quality of Water Entering San Diego Bay). There are also uncertainties regarding properties that can be obtained or what property interests are available. For these reasons, this strategy is not considered a high or medium priority at this time. Nevertheless, acquisitions of properties or recordation of conservation easements along floodplains for conservation protects these sensitive areas from urbanization and provides additional buffers for streams from direct and indirect effects. This conservation protects habitats and species dependent on these streams, the quality of the receiving waters, as well as other resources, such as cultural and historical properties.

### *Locations*

This type of land interest acquisition could occur anywhere along the streams in this watershed, primarily within the 100-year floodplain but could include transitional or upland buffer habitats as well. An example is property currently used for storage on both sides of the lower Otay River immediately upstream of I-805. There appears to be a river crossing at this location as well. The floodplain is noticeably narrower compared to reaches upstream and downstream of this location.

### *Expected Proponents*

The Working Group or Watershed Council should work together to identify potential parcels that are available. There might be parcels that regularly flood or suffer erosion, and their owners might be interested in selling or sharing management responsibilities. There might also be parcels of strategic interest along the Otay River or one of the main creeks (e.g., Jamul Creek, Dulzura Creek, Salt Creek). The group can then work together, perhaps with fluvial geomorphologists, restoration ecologists, or similar experts, on prioritizing the list of available floodplain parcels. Prioritization should consider the costs (e.g., land acquisition or conservation easement, demolition or relocation of structures or infrastructure, enhancement or restoration planning, project design and specifications, environmental review [CEQA and NEPA] and permits[federal, State, local], implementation of habitat enhancement or restoration activities, habitat maintenance and monitoring, and long-term land management) and the benefits (e.g., net gain in functions and values, increases in habitat types and species, protection of cultural resources, aesthetic improvements, increase in water storage/flood protection, water quality improvements).

### *Schedule*

It is possible that some parcels could be acquired in the short term (within 2 years), but this strategy is expected to be on-going, as more is learned about the watershed and additional parcels become available. Based on monitoring activities in this watershed, floodplain acquisition as a strategy might increase in priority.

### ***Maintenance and Monitoring Considerations***

Acquired parcels or areas protected by conservation easements would need to be periodically monitored, to ensure dumping or other harmful activities are not occurring on these parcels. If parcels are enhanced or restored, maintenance and monitoring would be necessary to ensure the habitat is successful in meeting performance standards and success criteria. Many of these activities could be performed by trained volunteers, or by a conservation entity, particularly if parcels are turned over to such an entity for long-term management.

### ***First-Order Cost***

Property acquisition costs vary based on many factors. Most acquisitions are expected to cost several hundred thousand dollars, but could exceed \$1 million. Costs associated with enhancement or restoration activities and follow-up maintenance and monitoring for a 5-year period would probably range from an average of \$30,000-\$80,000 per acre. There will also be longer-term maintenance, monitoring, and land management costs.

### ***Potential Funding Sources***

There are many sources of funding available to acquire floodplain properties. Grant (e.g., The Conservation Fund's American Land Conservation Award, Wetland Recovery Project Work Plan, and Small Grants Programs, and bond money (Propositions 40 and 50) are available. The SDRWQCB could also provide funding. In some cases, jurisdictions might determine that it makes fiscal sense (e.g., regular flooding or erosion) to acquire floodplain properties.

## **B.3.B. Protect, Enhance, and Restore Cultural Resources**

### ***Target Goals, Objectives, Actions***

This strategy is intended to address the following goal and objective of the ORWMP:

#### **Goal 1. Protect, Enhance, and Restore Watershed Resources**

Objective E. Protect, enhance, and restore key ecological, cultural, and paleontological resources.

### ***Activities and Benefits***

There are a variety of cultural/historical resources in this watershed, which is not surprising given that people have occupied parts of this watershed for the last 9,000 years. Resources include isolated artifacts, lithic scatter artifacts, temporary camps, habitation sites, historic buildings, and historic trash deposits. Several historical sites were discussed in the *Otay River Watershed Assessment Technical Report* (Aspen, 2004). These include the following: Barrett House, circa 1890, central Jamul; La Follet House, circa 1895, off Jefferson; Rock House, circa 1895, on Hillside Drive; Jamul School House; Lawson Valley School in Lee Valley; Schnell house, west of intersection of Lawson Valley Road and Skyline Truck Trail; Bratton House, circa 1900, Deerhorn Valley Road; Wats House, Mother Grundy Truck Trail; Jamul Rancho building site east of Pio Pico Park; Plumers House, circa 1915, north of Dulzura Café; Dulzura Café, circa 1900; Clark Ranch, rebuilt 1900, on Dulzura Creek; Hagenback House, near Forestry Station; Schekler House, east of Highway 94 at Marron Valley Road; and the Winnetka Ranch House.

Many cultural resources are protected within the preserves established by the MSCP and various other resource and land-use plans and programs in this watershed. In addition, many cultural resources are associated with aquatic resource areas, which are afforded federal, State, and local protection. There are also local ordinances (e.g., County's RPO) and other requirements specifically focused on protecting these sensitive resources. The companion Special Area Management Plan process includes the identification and protection of many of the cultural resources in this watershed. In fact, as part of the SAMP development process, the U.S. Army Corps of Engineers and the County of San Diego are currently developing a map of known cultural resource locations in this watershed. This map will assist the completion of the Section 106 consultation process (pursuant to the National Historic Preservation Act of 1966) with the State Historic Preservation Officer. Therefore, efforts solely focused on protecting or enhancing/restoring cultural resources are not considered a high or medium priority for the Otay River Watershed Management Plan at this time. Rather, there might be instances where culture resource protection or enhancement/restoration opportunities become available in the watershed. These opportunities should be seriously considered, particularly if they would also protect natural resources.

### ***Locations***

Cultural resources occur throughout the watershed. As discussed, the County of San Diego and the U.S. Army Corps of Engineers are currently preparing a map of known resource locations, which will assist the Corps in satisfying their Section 106 (National Historic Preservation Act) responsibilities as part of the SAMP. Typically, maps of cultural resources are not made available to the public to limit the potential for vandalism or destruction of these sensitive resources.

### ***Expected Proponents***

The Working Group or Watershed Council should work together to identify cultural or historical resources of interest. The group can then prioritize the list of resources that should be protected and which ones could be enhanced or restored. Prioritization should be based on consideration of all the costs and benefits anticipated with each potential project.

### ***Schedule***

Cultural resource protection, enhancement, and/or restoration could occur at any time. Timeframes could be lengthened if property acquisition or conservation easements are necessary.

### ***Maintenance and Monitoring Considerations***

In some cases, such as buried resources, follow-up monitoring would not be necessary. For exposed resources, such as buildings, some level of ongoing maintenance and monitoring would be required.

### ***First-Order Cost***

The main costs associated with this strategy are anticipated to be property or easement acquisitions and on-going maintenance and monitoring activities. Acquisition costs could be in excess of \$100,000.

### ***Potential Funding Sources***

There are fewer opportunities for grant and bond money to protect and enhance cultural resources. In many cases, benefactors fund these activities, or local preservation groups provide or raise the necessary funds. Nevertheless, the new California Cultural and Historical Endowment Board recently

awarded more than \$35 million in grant funding to 33 State projects. This Board used money from Proposition 40, a \$2.6 billion bond measure that includes \$276 million for acquisition, development, and preservation of culturally and/or historically significant properties, structures, and artifacts. Half of the total allotment went to projects specified in Proposition 40, but the rest is being distributed by the Board. More of the remaining funds will be awarded in two cycles starting next year.

## C. SUMMARY

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This report summarizes sixteen strategies focused on protecting, enhancing, restoring, and managing the Otay River watershed's natural and cultural resources, while allowing for reasonable economic development and other uses to occur. Key considerations are listed for each strategy, with the consulting team initially categorizing each as a high-, medium-, or low-priority strategy. The category for any strategy can be changed based on new or additional information about the watershed or input from watershed stakeholders. Stakeholder input is particularly valuable, because these are the parties who live, work, or otherwise use this watershed and have an interest in guiding its future.

In reviewing each strategy, it is clear that there are a variety of data sources available that will be important in moving forward to the implementation phase. However, there are also data gaps that must be addressed, depending on which strategies are accepted by the stakeholders and decision-makers as worth pursuing. For example, the *Draft Habitat Restoration Plan for the Otay Valley Regional Park* (HDR Engineering, 2004) provides important baseline information about non-native plants in the OVRP, particularly in the Phase I area (i.e., from the western edge of the OVRP to Heritage Road). This plan, as well as the U.S. Army Corps of Engineers Engineering and Research Development Center and Cold Regions Research and Engineering Laboratory's *Planning-Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County, California* (2003) and Rancho Jamul planning documents, provide important baseline information on the non-native species in this watershed. However, the locations and extents of non-native flora outside the OVRP Phase I area have not been well characterized, nor have the locations and distributions of non-native fauna outside of Rancho Jamul. For this reason, a watershed-wide survey is strongly recommended for the watershed outside of these well-characterized areas.

Moving forward, it will be difficult to accurately estimate costs (and required funding) and where strategies are likely to be most effective without addressing the specific data gaps for the strategies that are advanced toward implementation. For a few of the strategies, such as Limit Directly Connected Impervious Surface Area, we recommend conducting additional research specific to this watershed before it is implemented. Therefore, while these strategies provide the framework for protecting, enhancing, restoring, and managing the watershed's resources, additional studies and several other steps will need to be completed before most of these strategies can be implemented.

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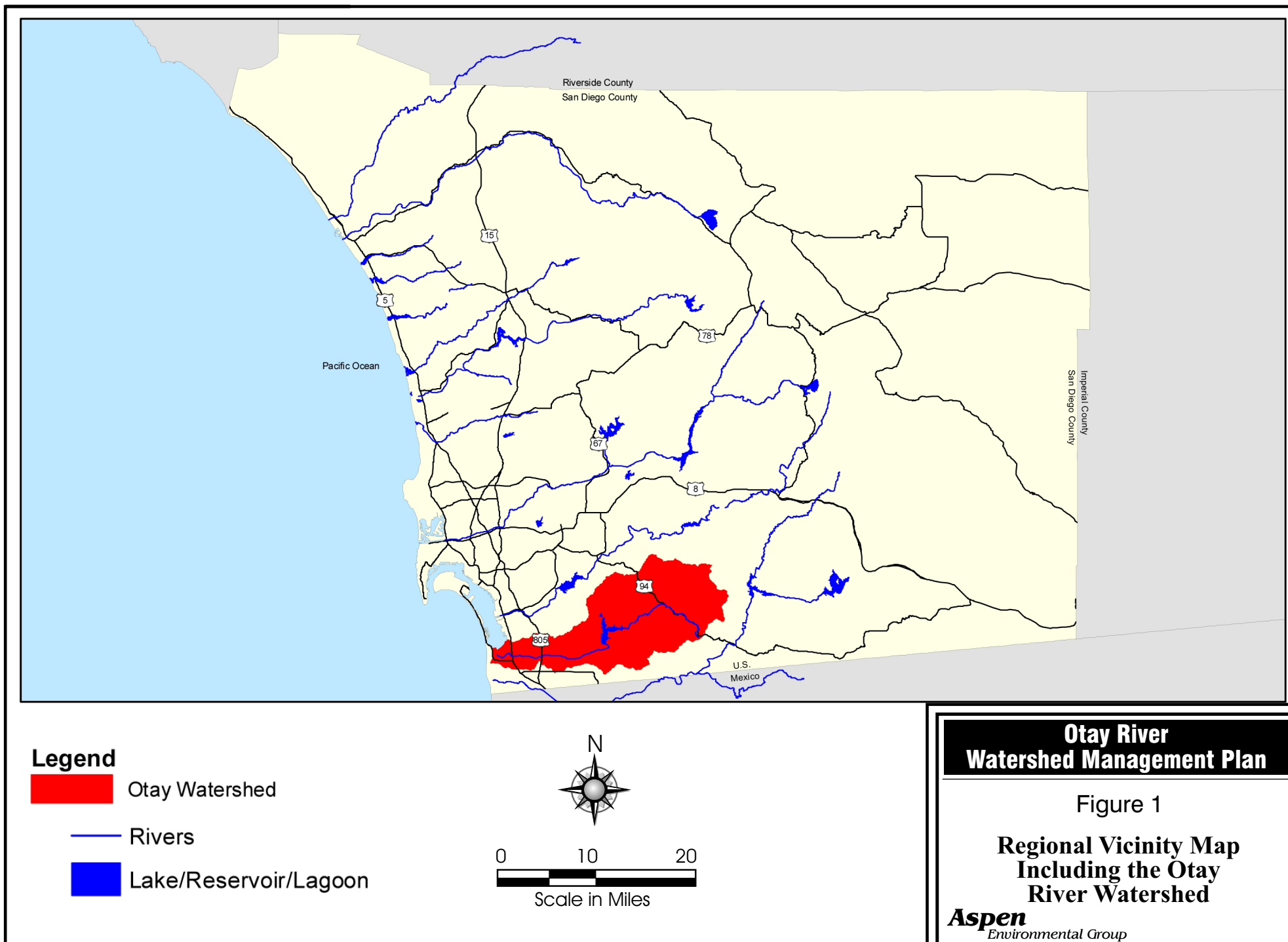
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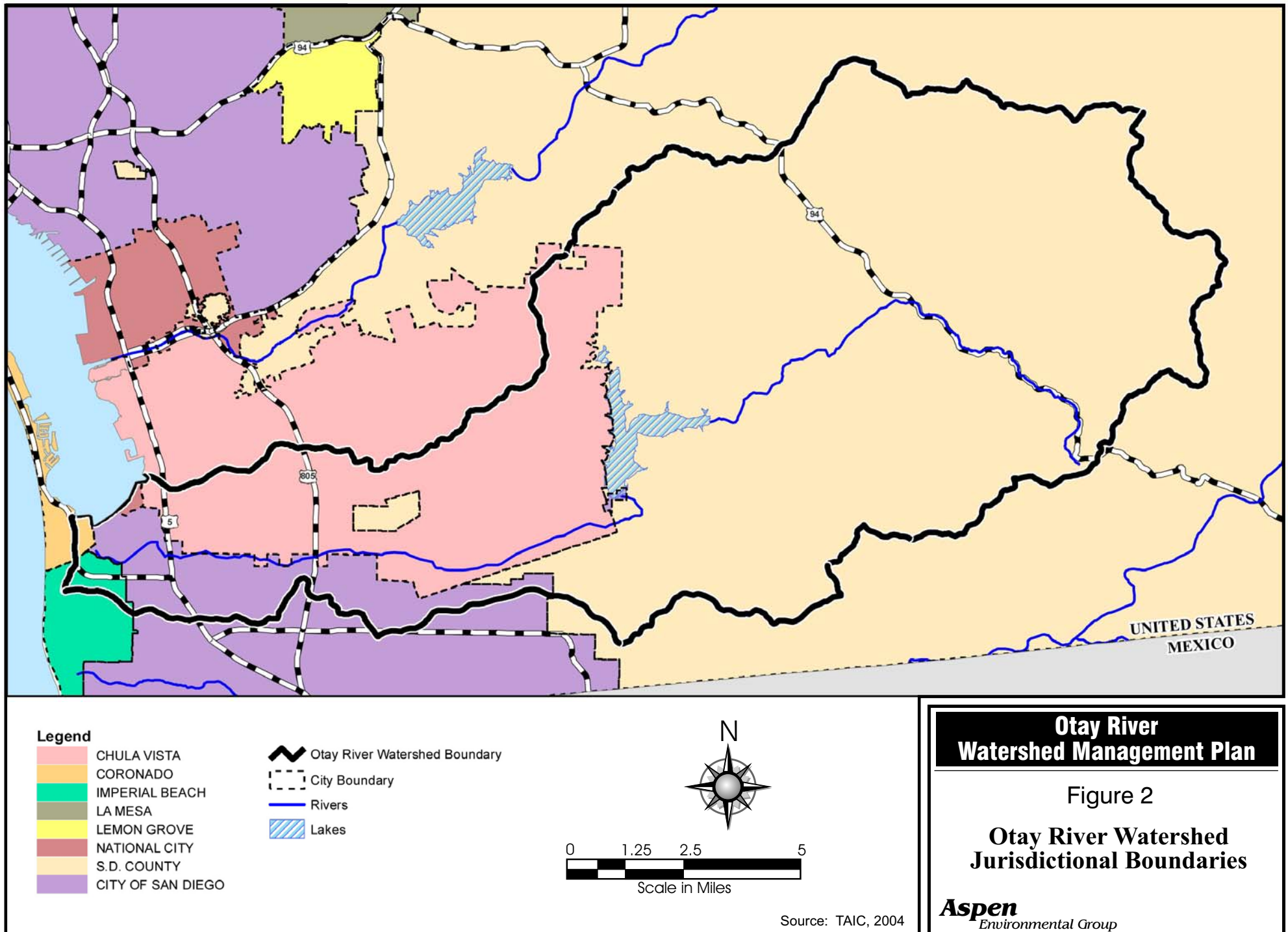
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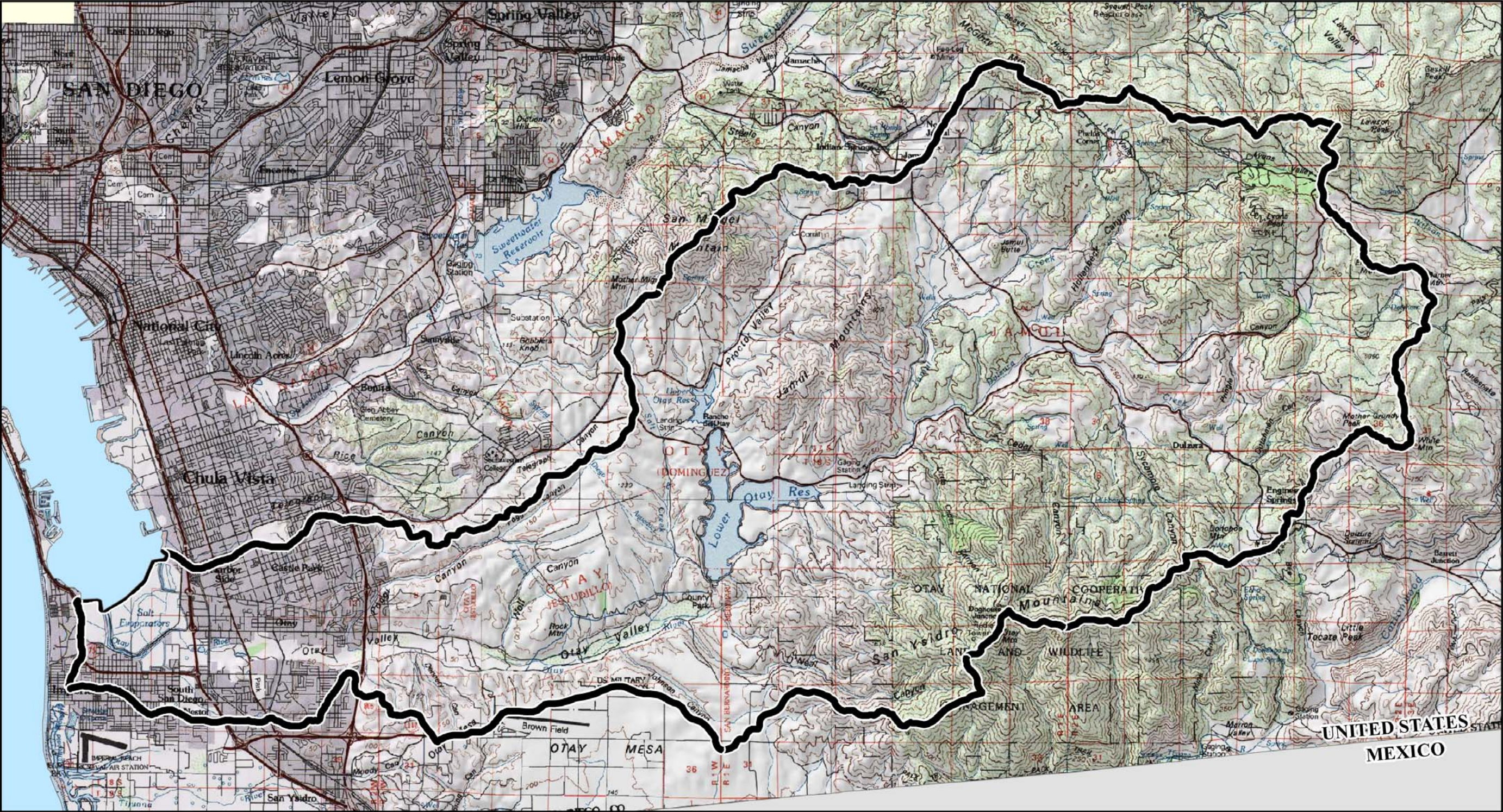


## Otay River Watershed Management Plan

Figure 2

### Otay River Watershed Jurisdictional Boundaries

**Aspen**  
Environmental Group



**Basemap Legend**

 Otay River Watershed Boundary

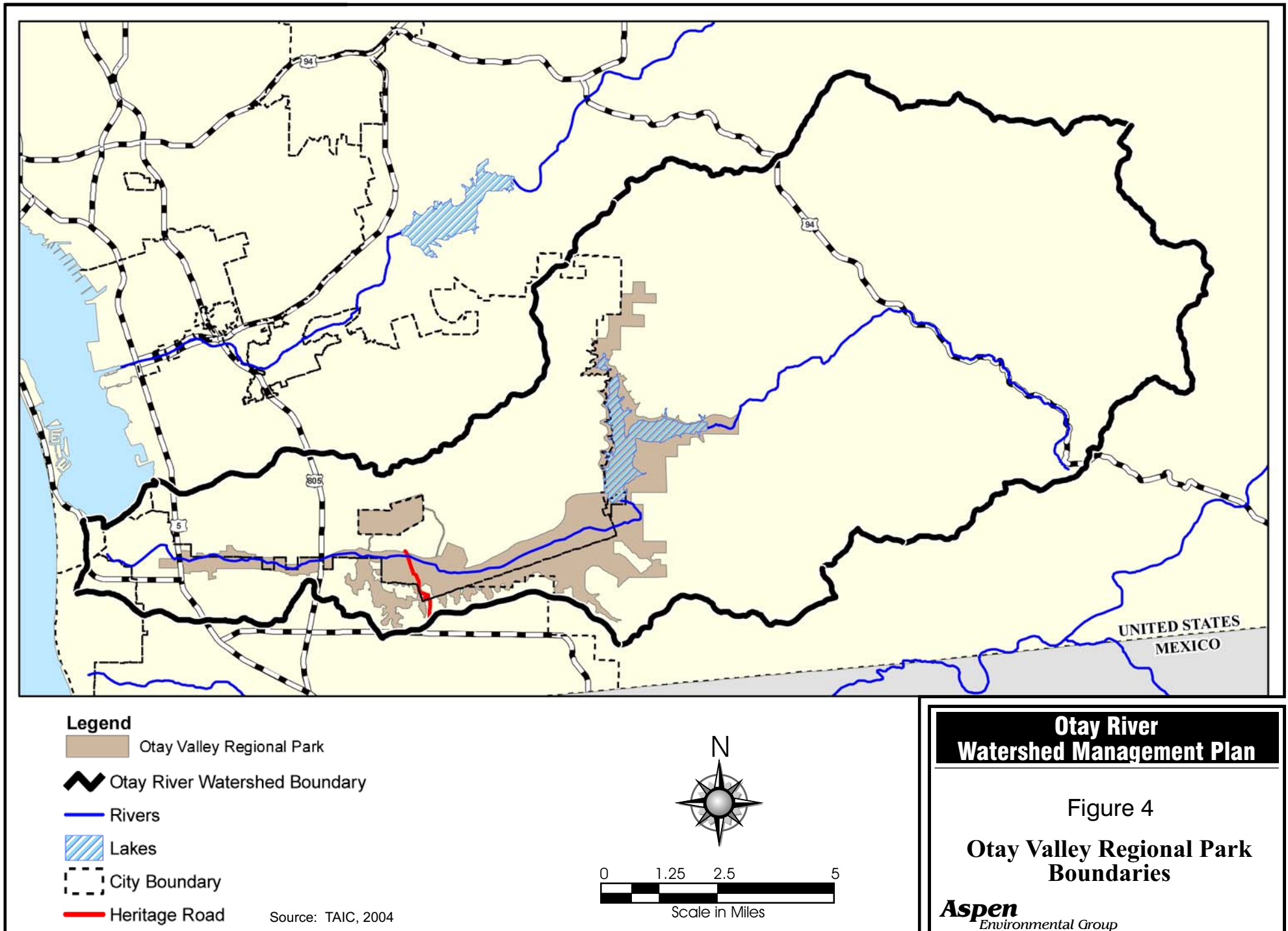


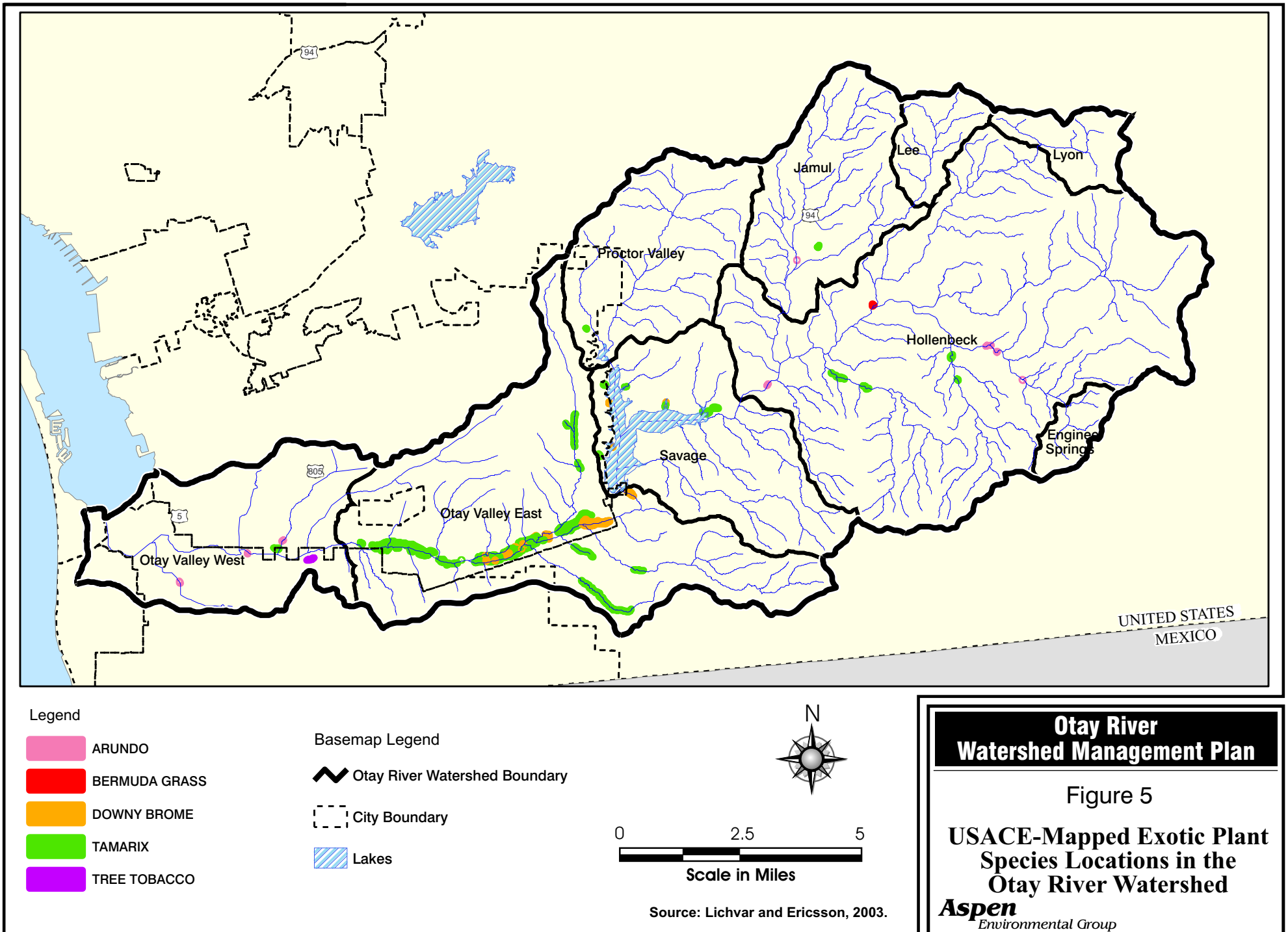
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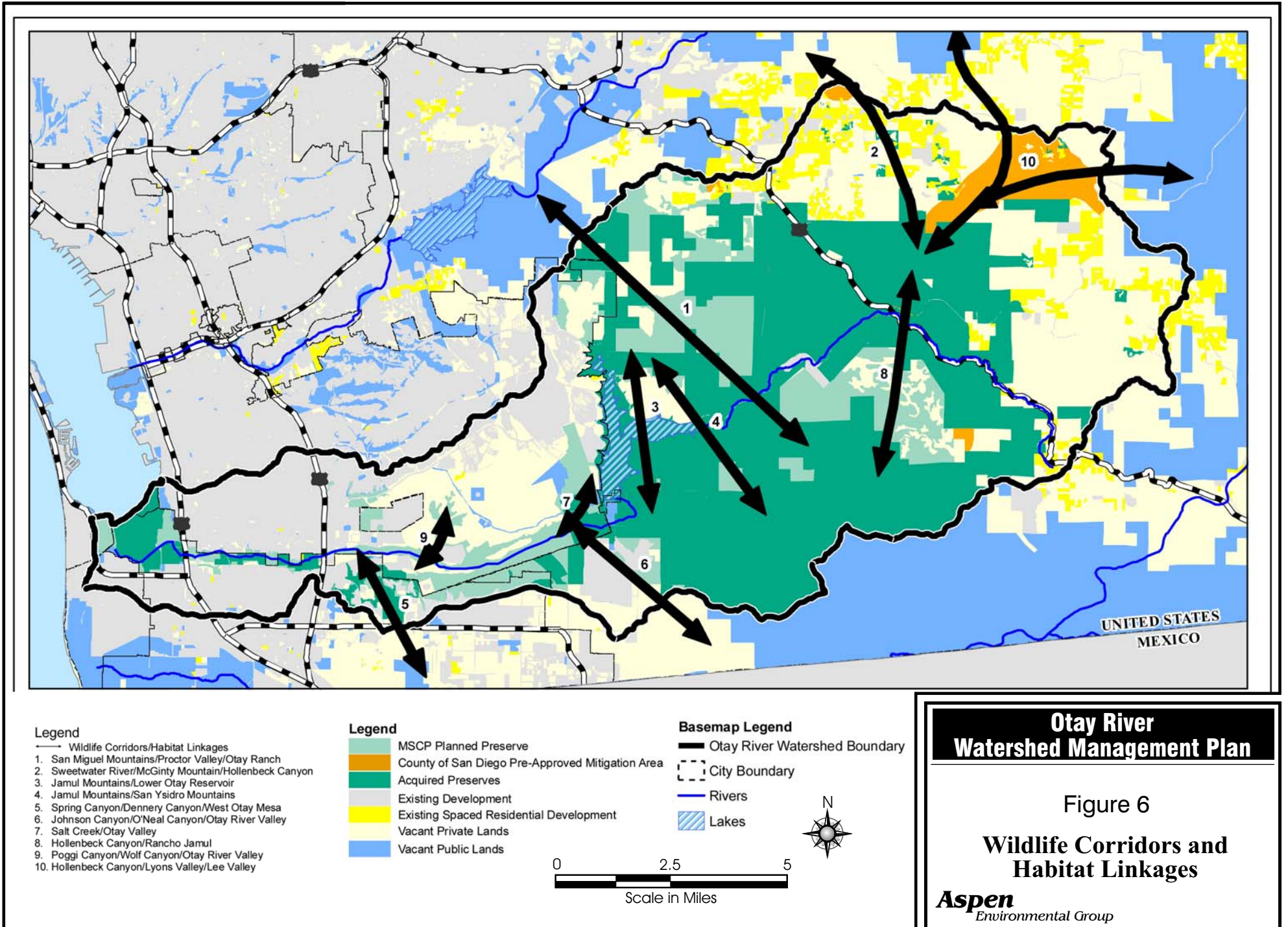
**Otay River  
Watershed Management Plan**

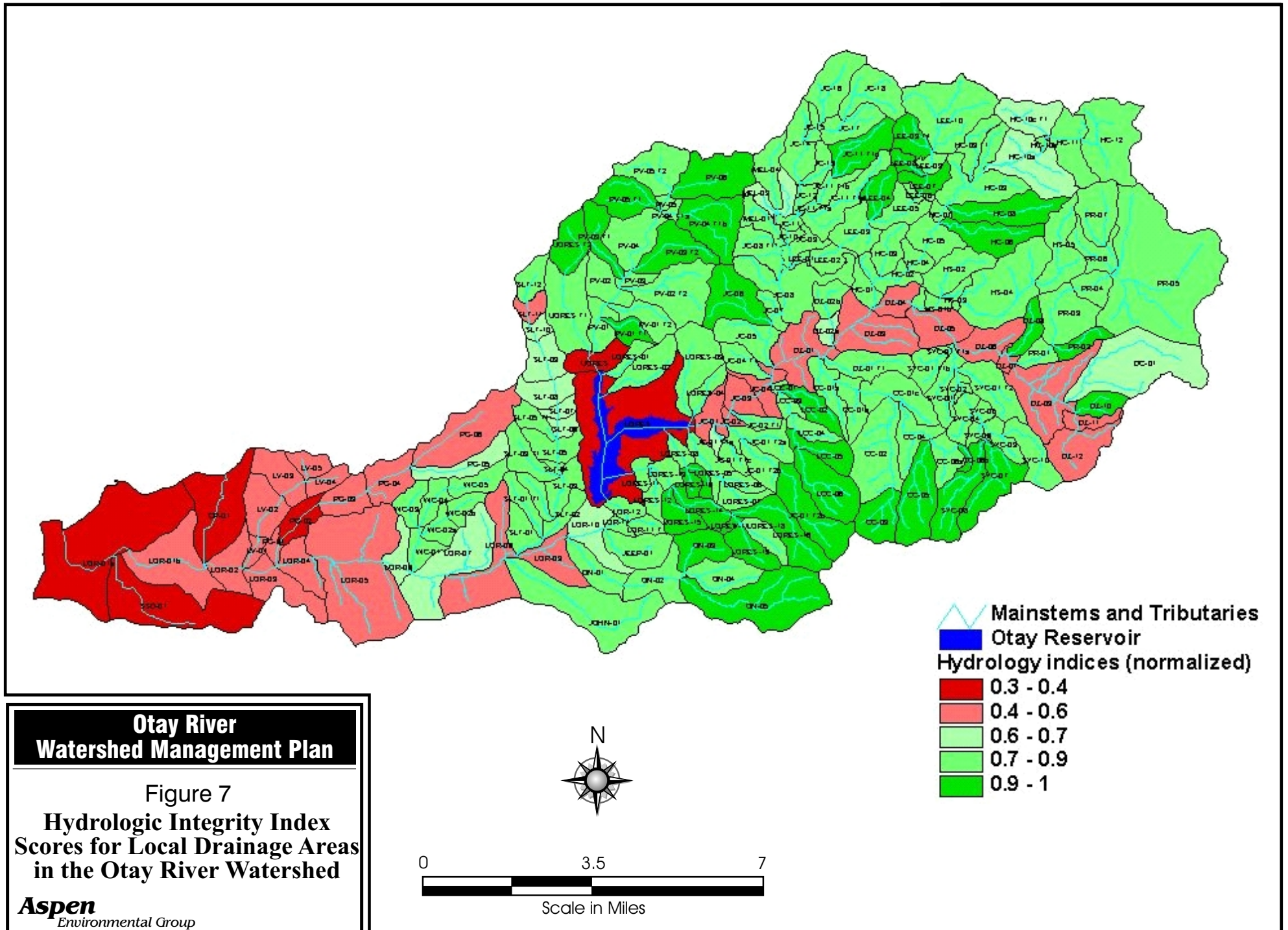
Figure 3  
USGS 100,000 Scale  
Topographic Map

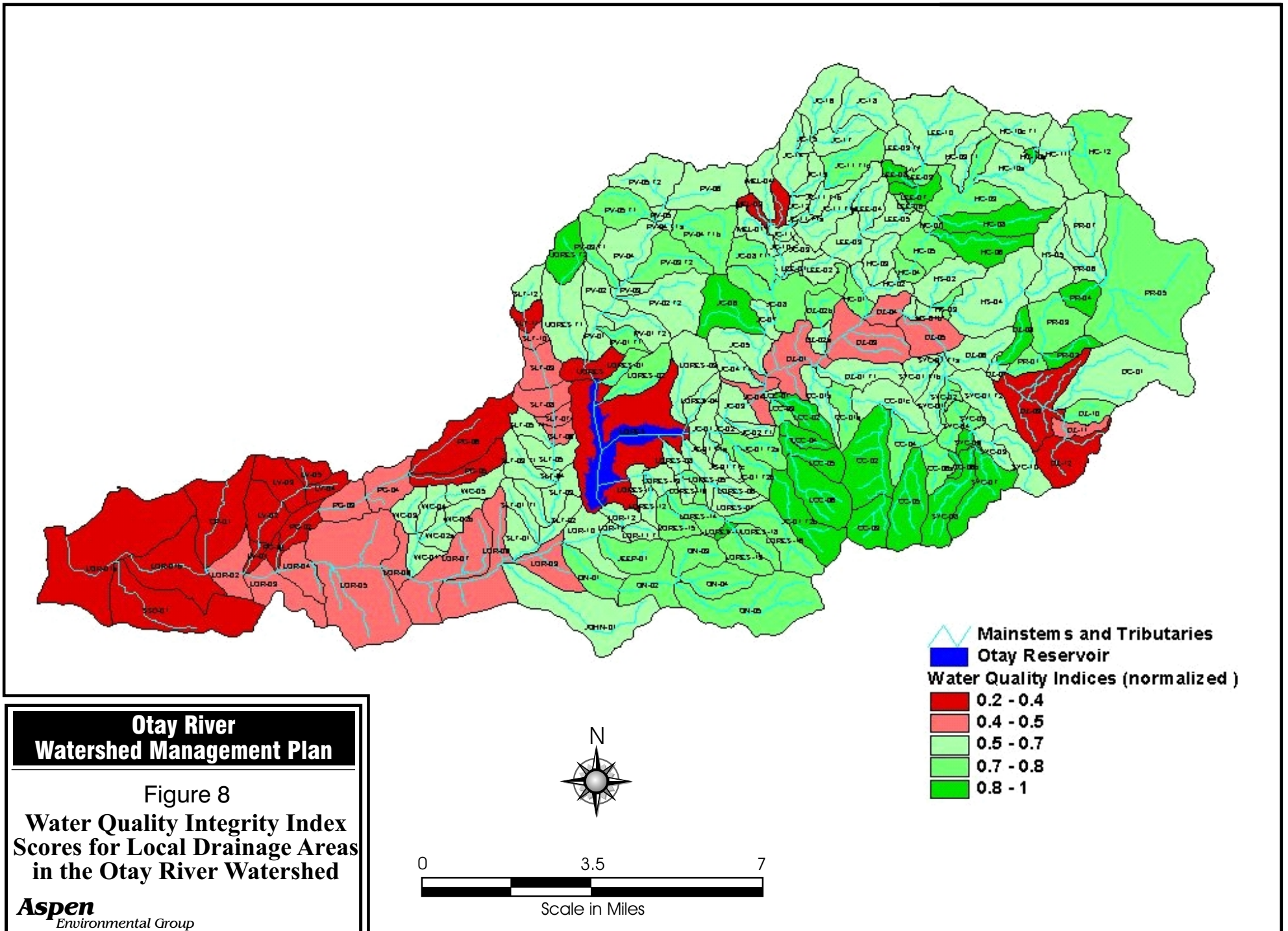
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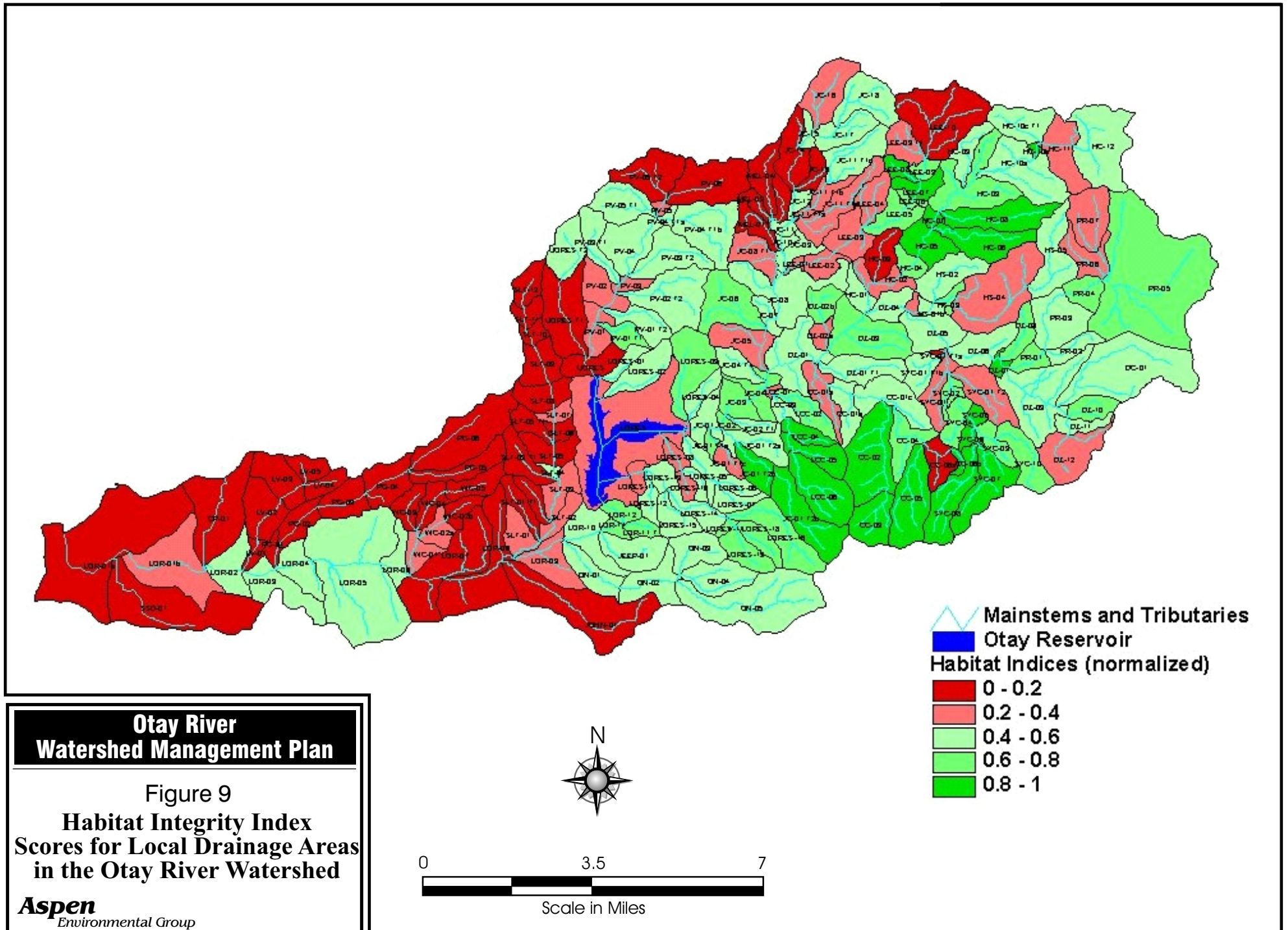


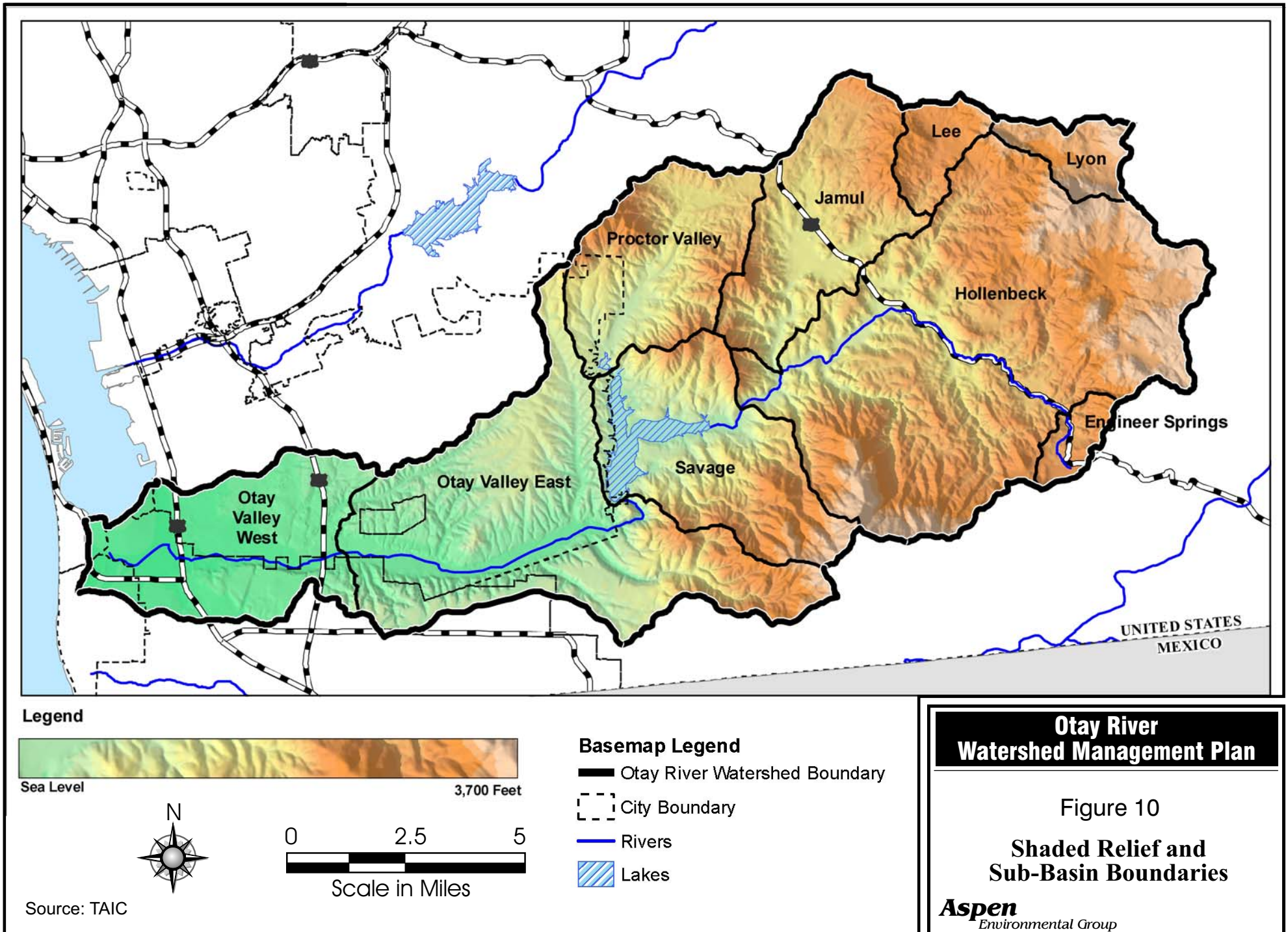


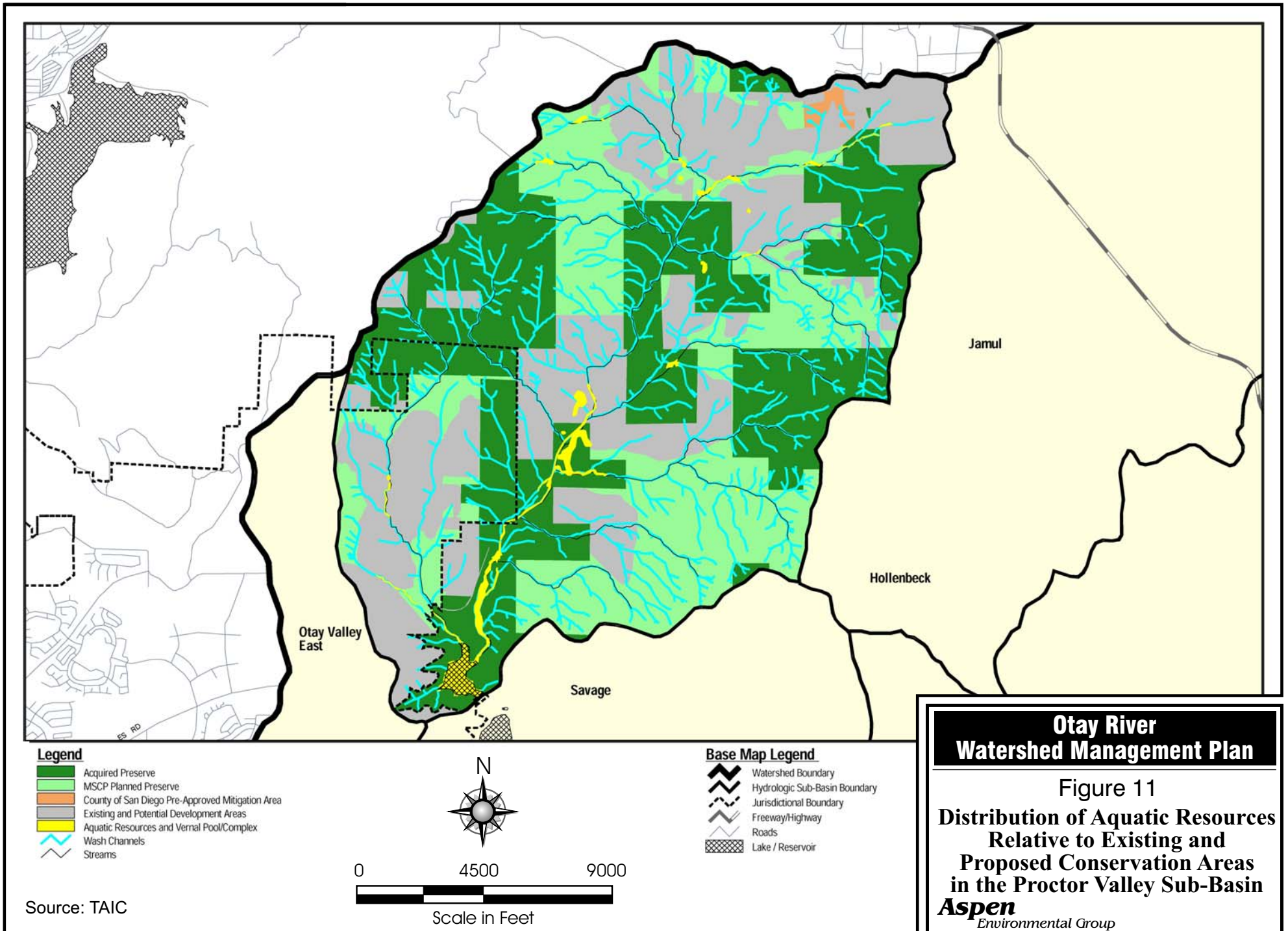


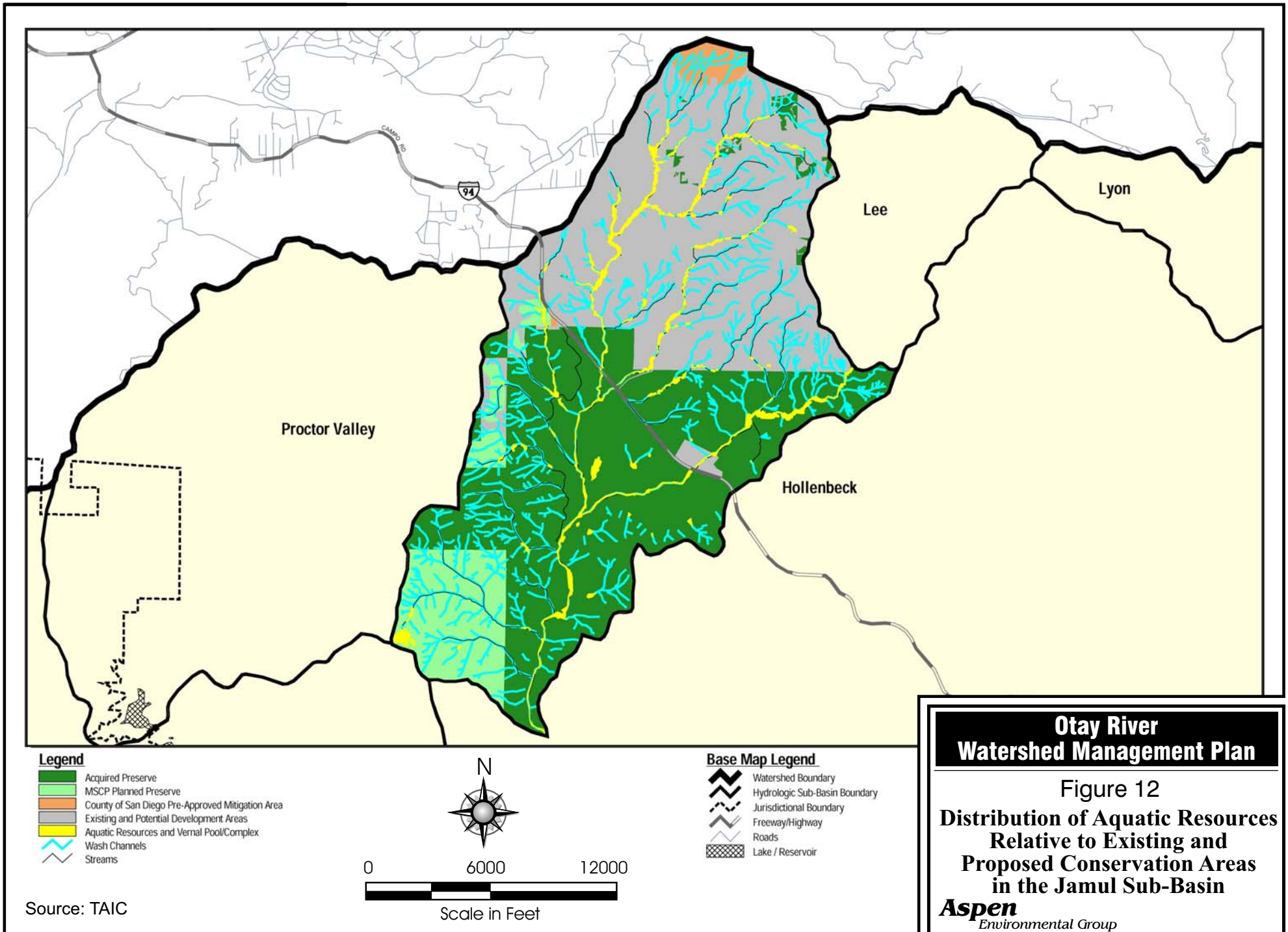


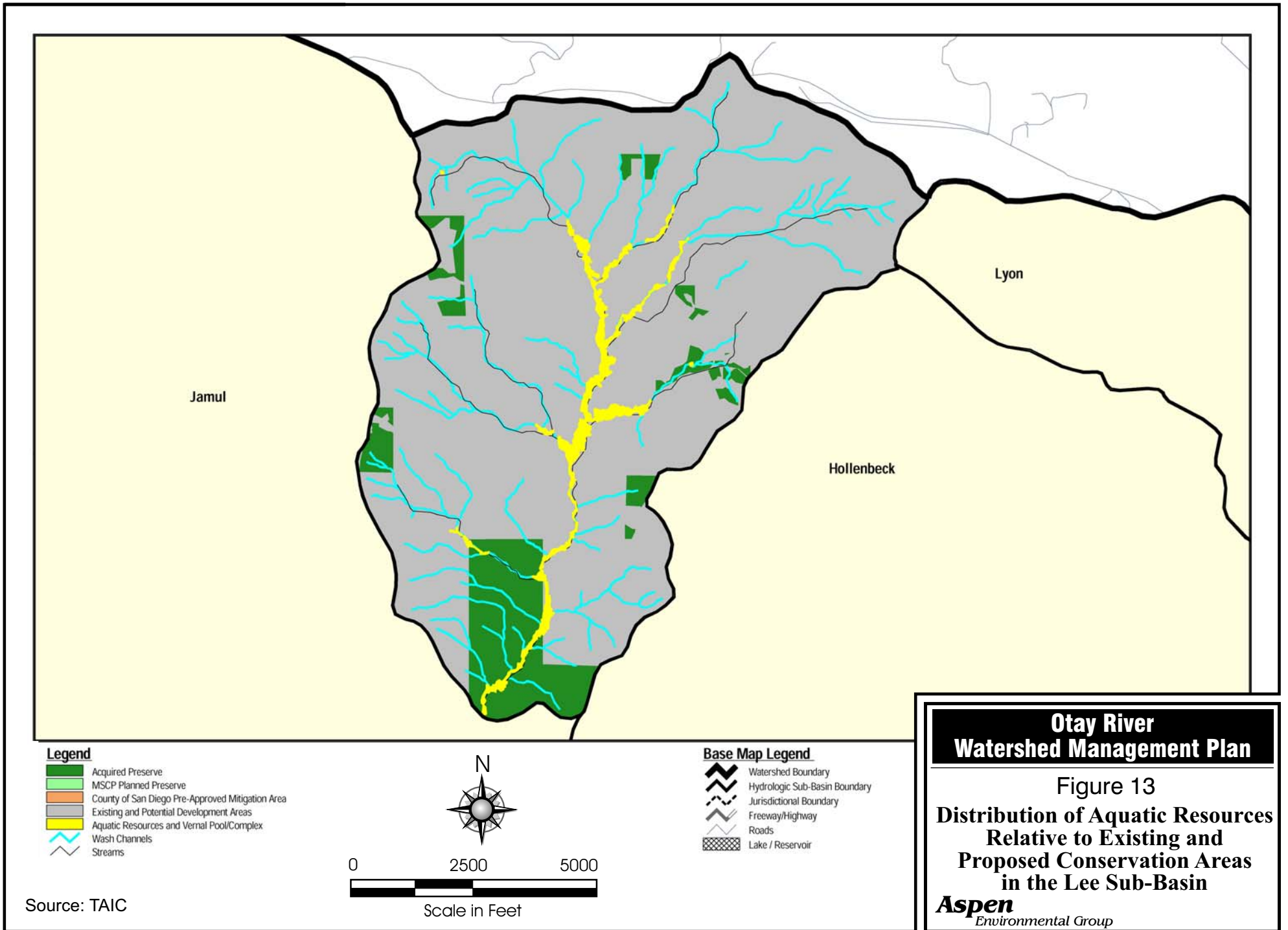


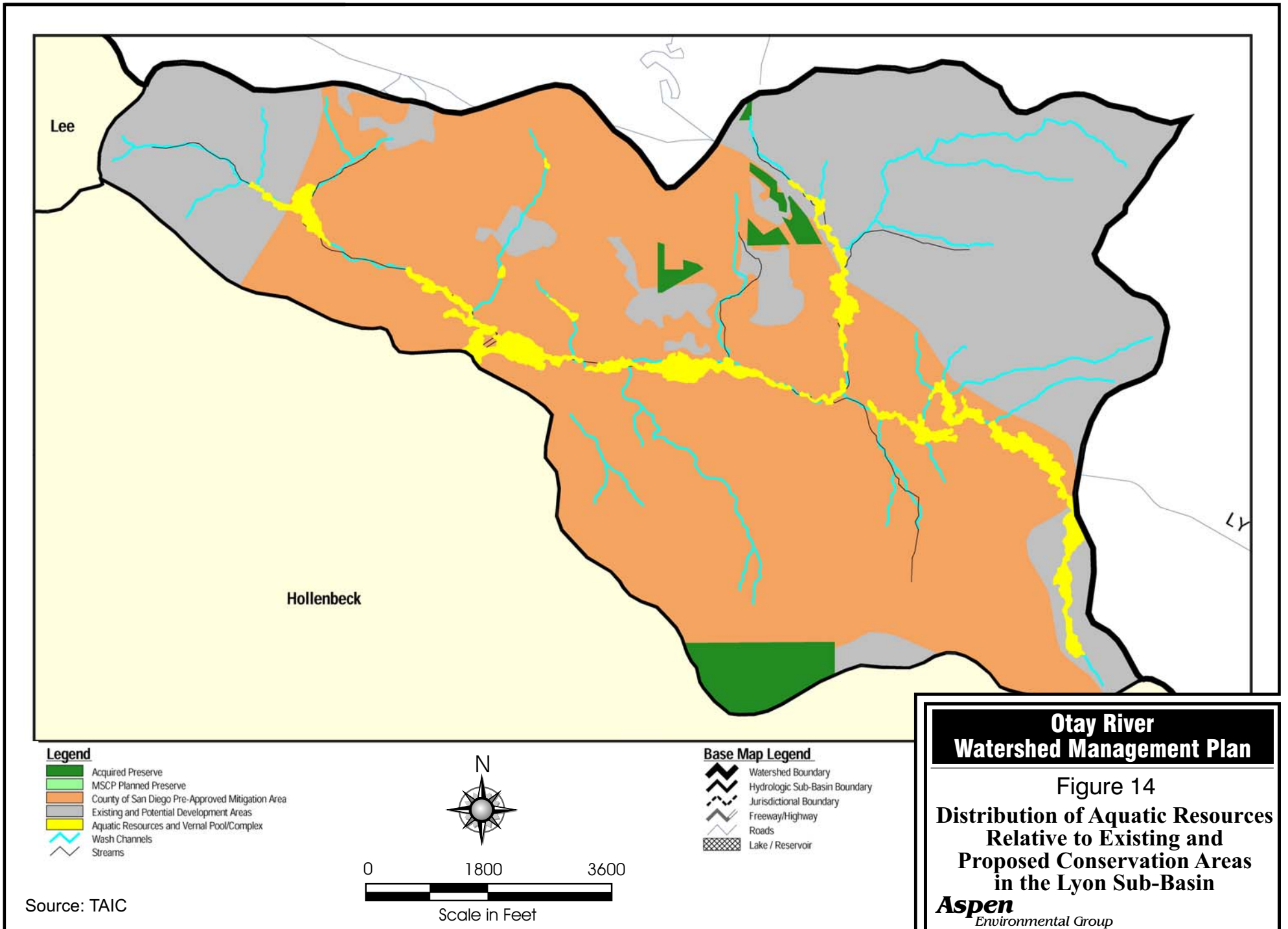


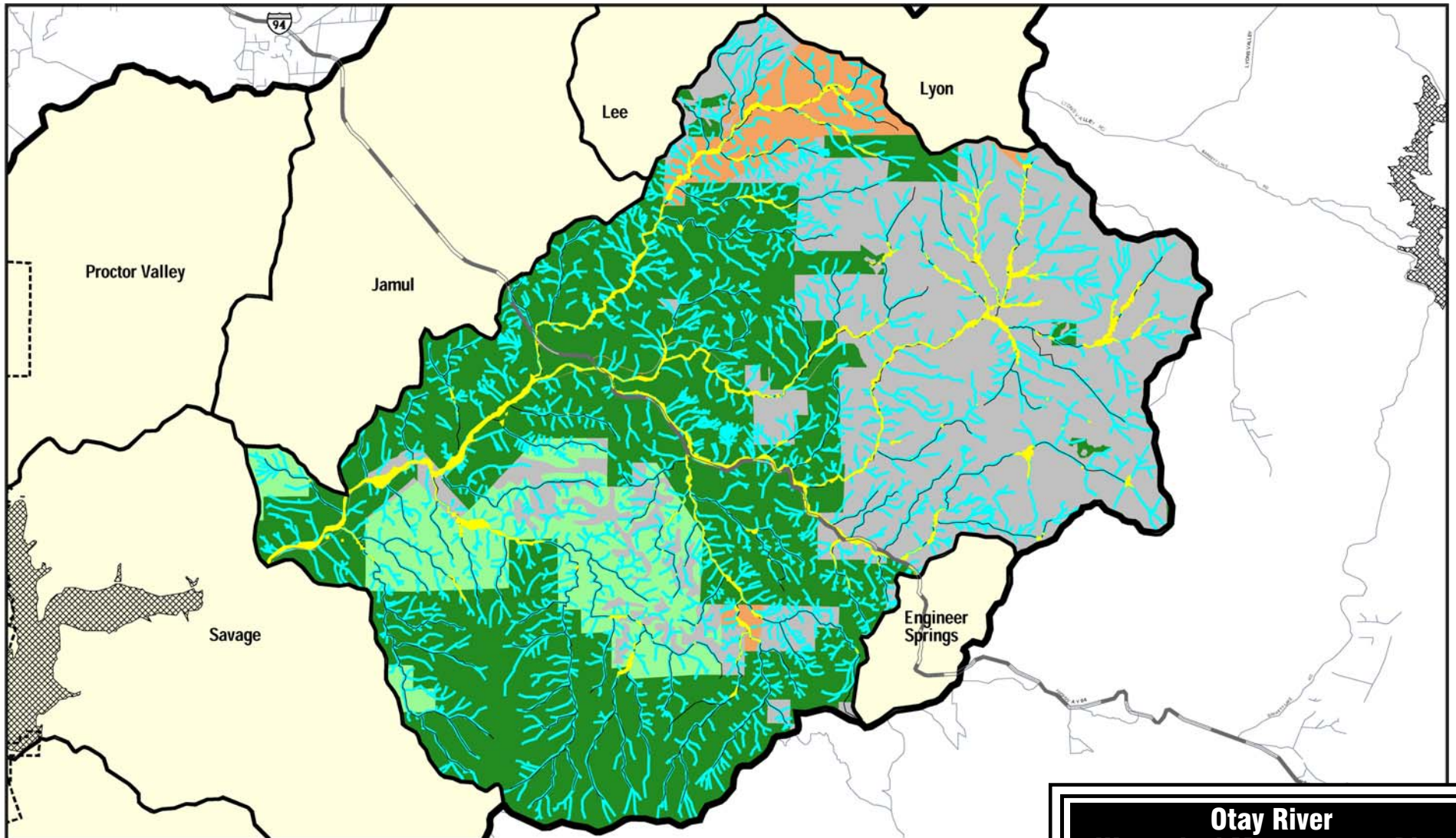




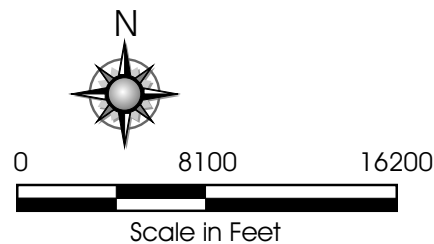








- Legend**
- Acquired Preserve
  - MSCP Planned Preserve
  - County of San Diego Pre-Approved Mitigation Area
  - Existing and Potential Development Areas
  - Aquatic Resources and Vernal Pool/Complex
  - Wash Channels
  - Streams



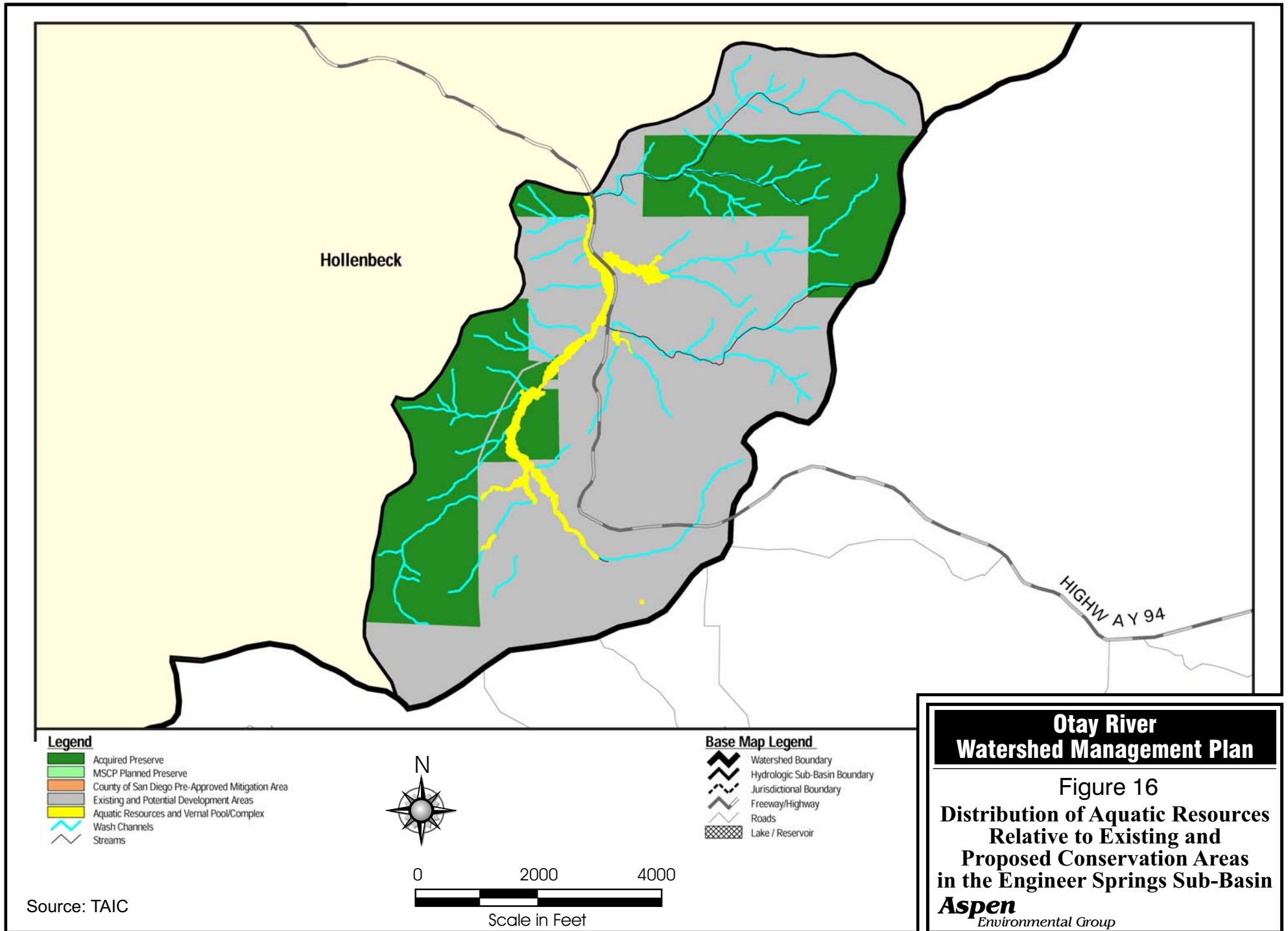
- Base Map Legend**
- Watershed Boundary
  - Hydrologic Sub-Basin Boundary
  - Jurisdictional Boundary
  - Freeway/Highway
  - Roads
  - Lake / Reservoir

## Otay River Watershed Management Plan

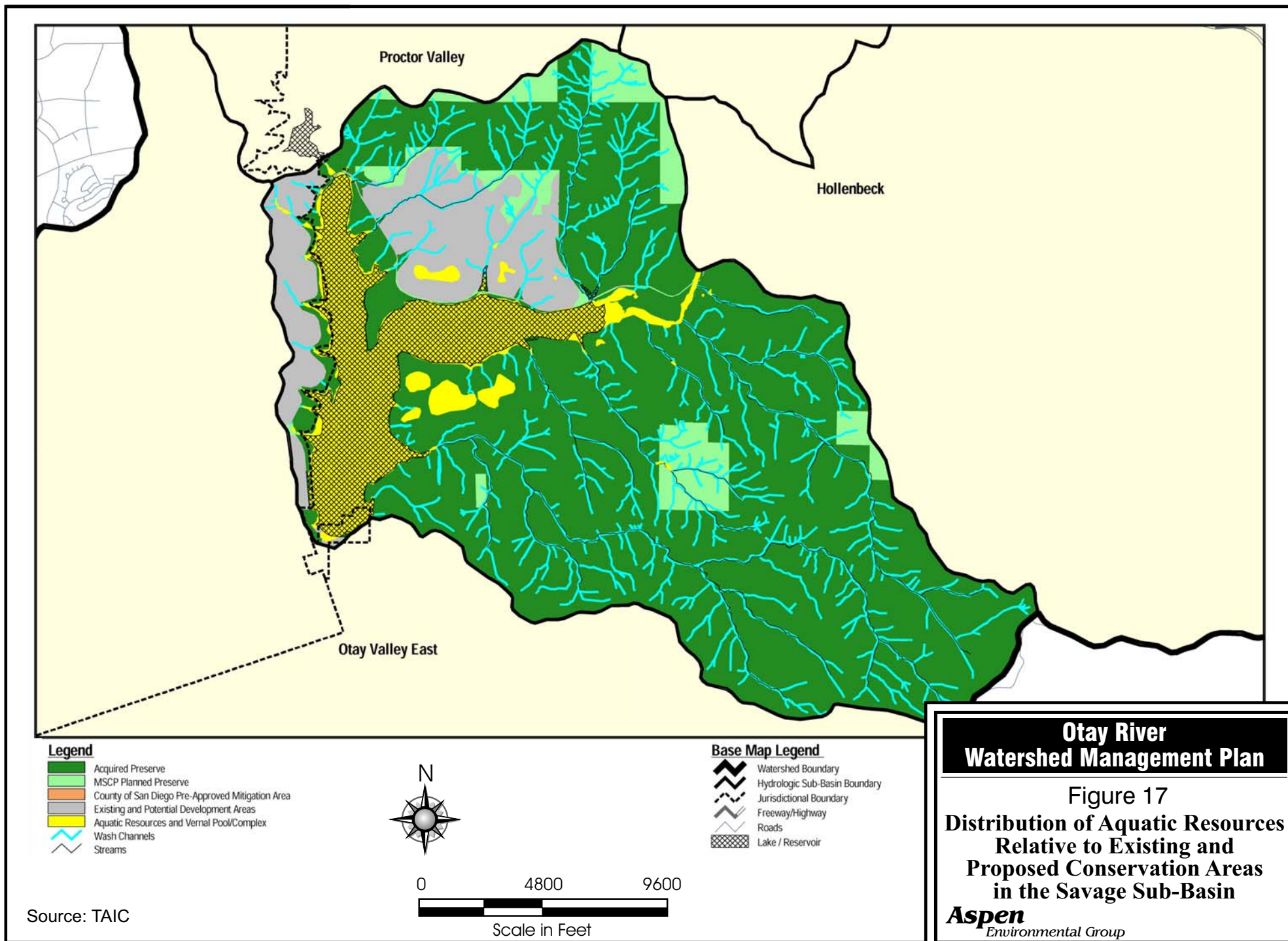
Figure 15  
Distribution of Aquatic Resources  
Relative to Existing and Proposed  
Conservation Areas in  
the Hollenbeck Sub-Basin

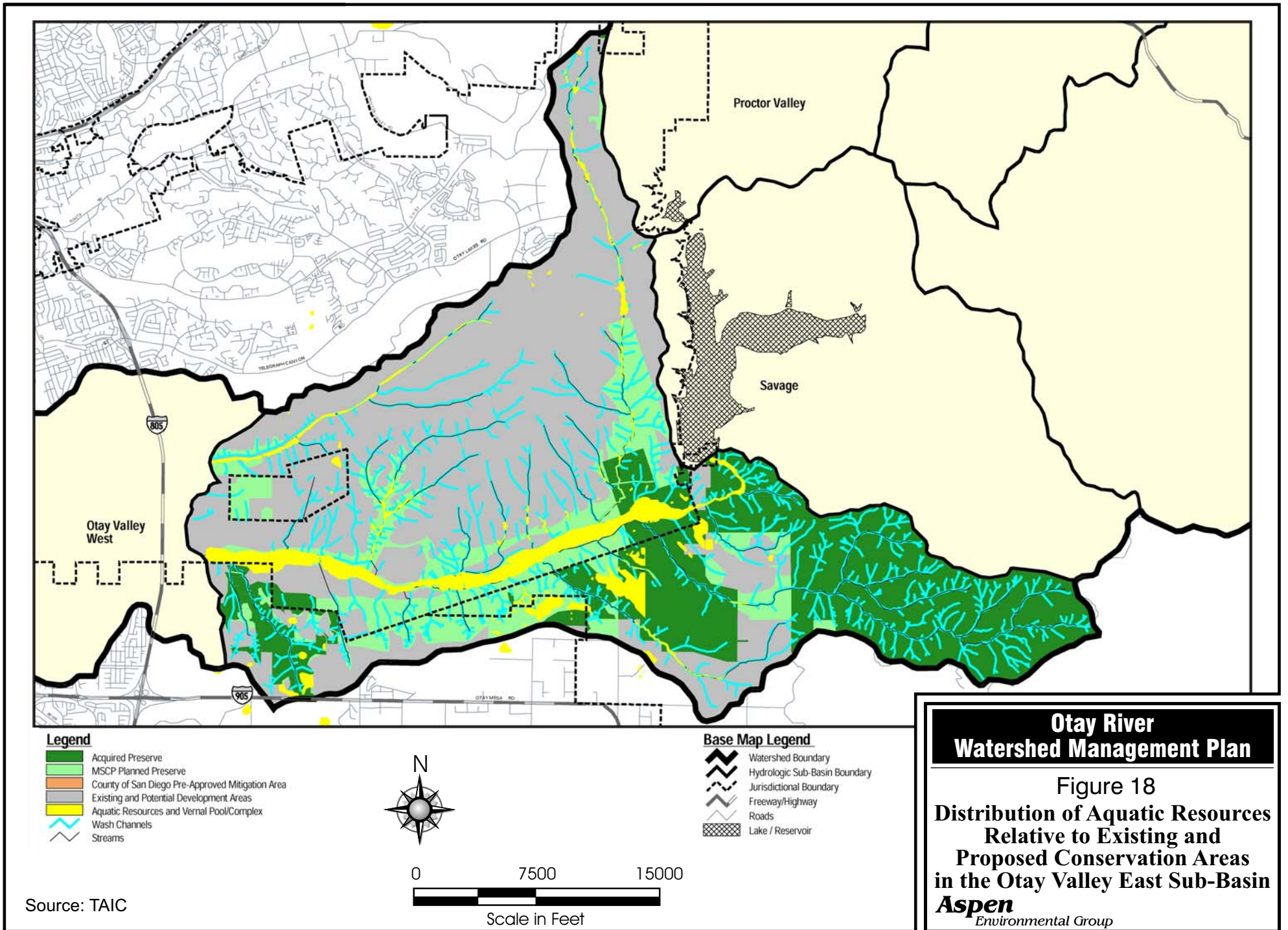
**Aspen**  
Environmental Group

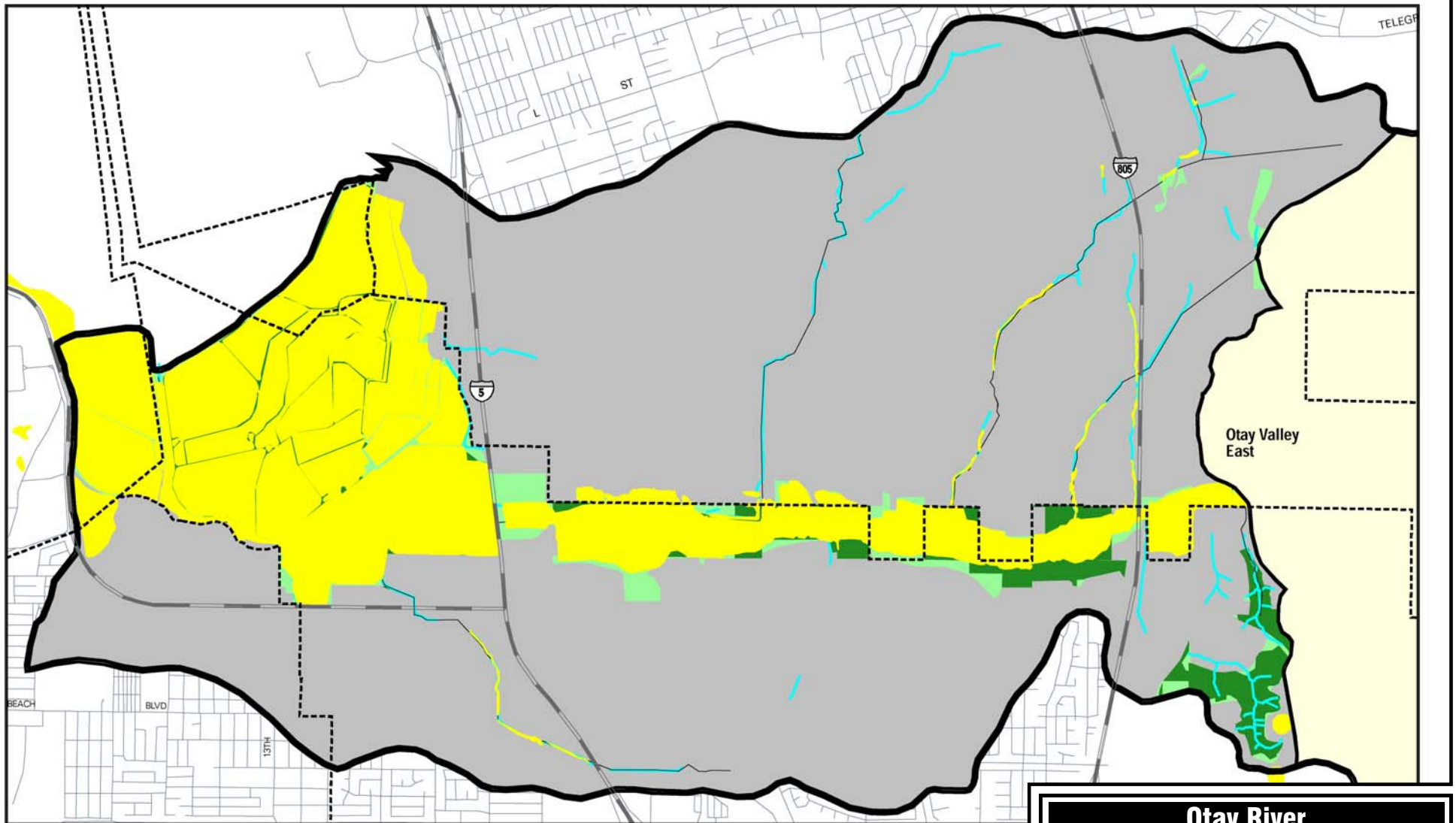
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#### Legend

- Acquired Preserve
- MSCP Planned Preserve
- County of San Diego Pre-Approved Mitigation Area
- Existing and Potential Development Areas
- Aquatic Resources and Vernal Pool/Complex
- Wash Channels
- Streams

#### Base Map Legend

- Watershed Boundary
- Hydrologic Sub-Basin Boundary
- Jurisdictional Boundary
- Freeway/Highway
- Roads
- Lake / Reservoir

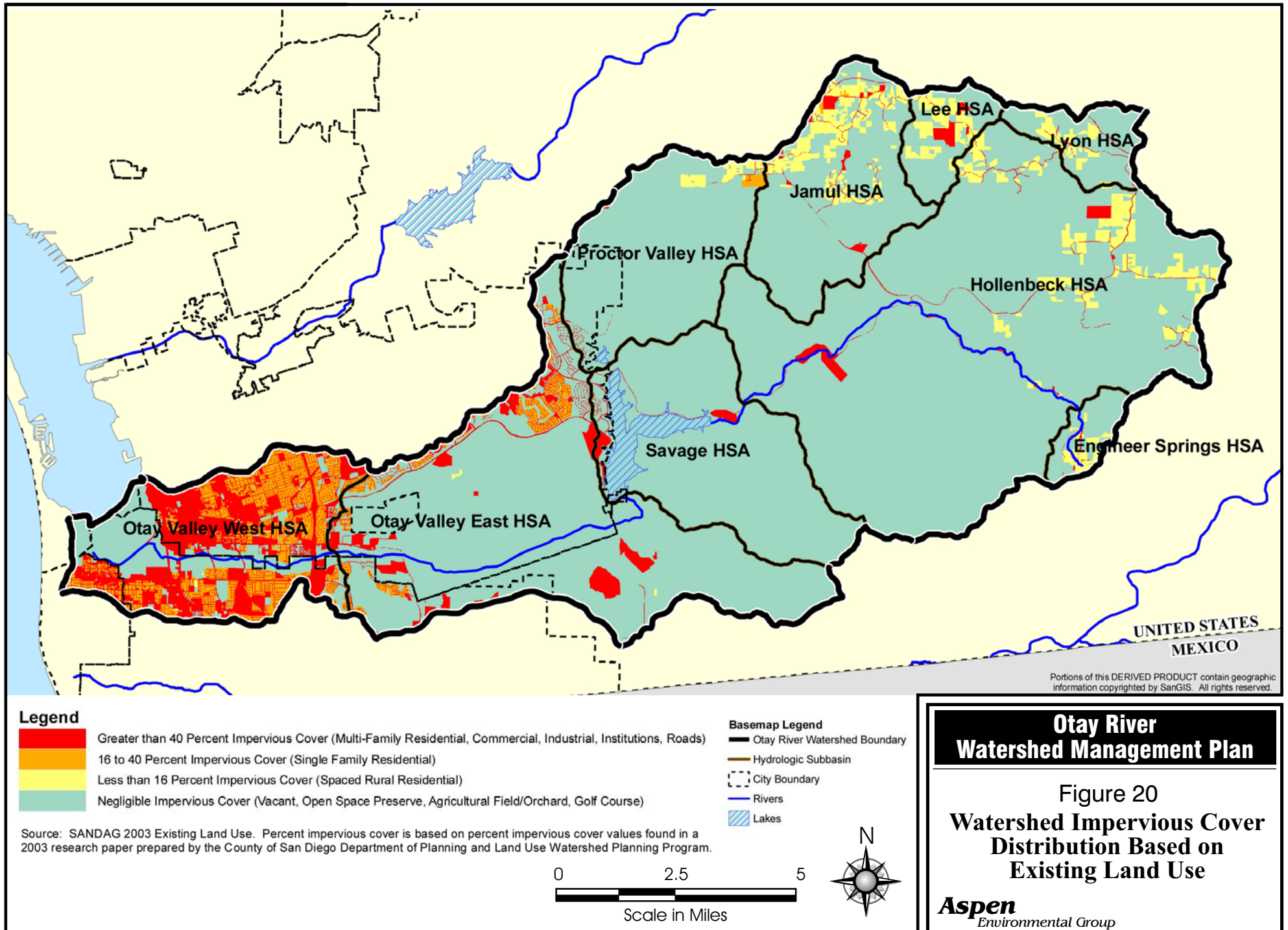


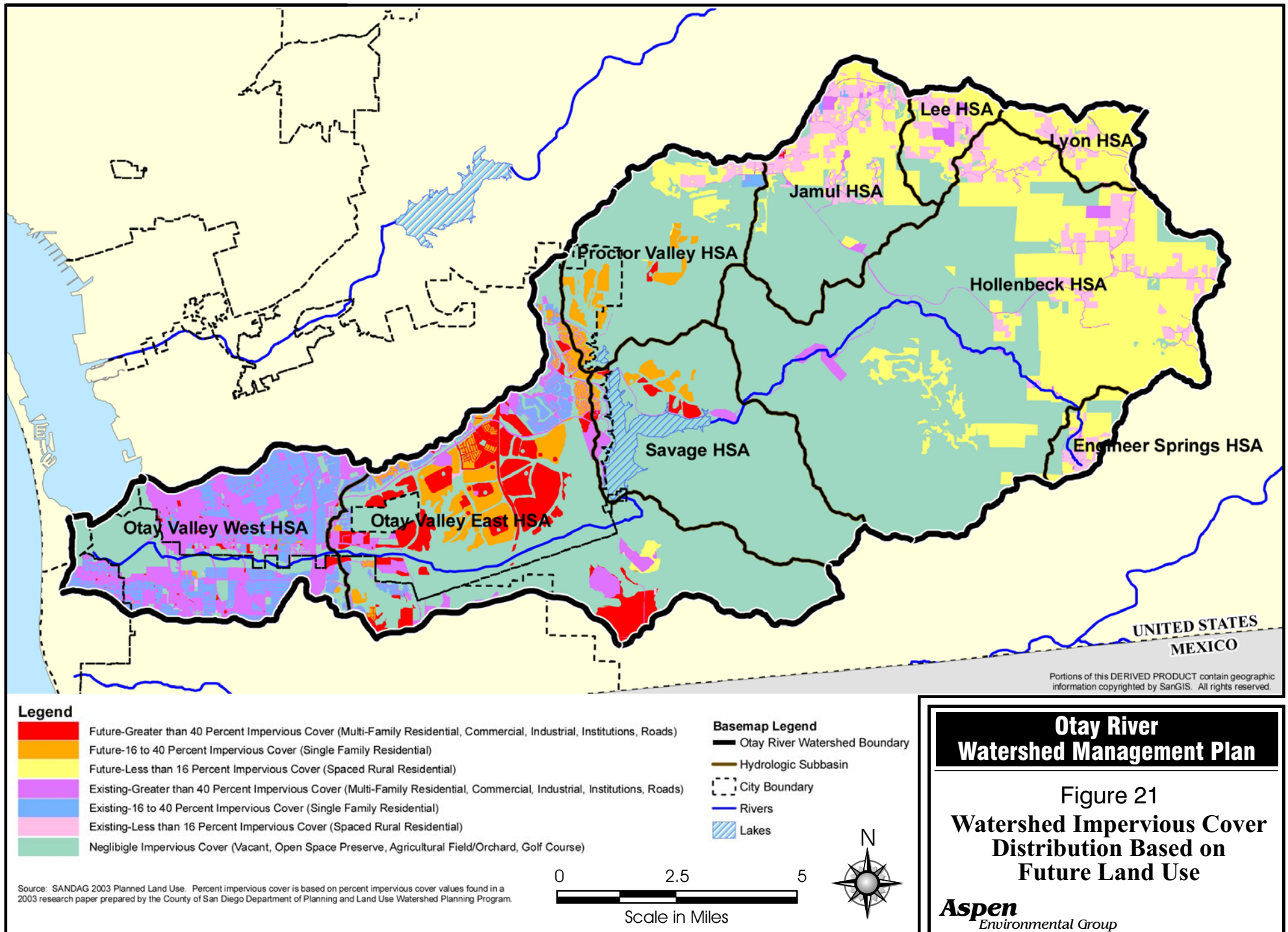
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Scale in Feet

Source: TAIC

### Otay River Watershed Management Plan

Figure 19  
Distribution of Aquatic Resources  
Relative to Existing and  
Proposed Conservation Areas  
in the Otay Valley West Sub-Basin  
**Aspen**  
Environmental Group







View upstream of Max Avenue: note annual grasses and other exotics and terrace/transitional zone restoration potential on southeast side of channel.



View downstream toward Max Avenue: note fills and encroachment along northwest side of floodplain, various exotic plants, and terrace/transitional zone restoration potential on southeast side.



View downstream of Max Avenue: note various grasses, exotic trees, rock riprap that could be removed, and floodplain encroachment that currently limits restoration potential.



View downstream towards Orange Avenue: note various grasses and exotic trees that could be removed, and floodplain encroachment that currently limits restoration potential.

## Otay River Watershed Management Plan

Figure 22  
**Restoration Options for  
the Unnamed Tributary  
Through Loma Verde Park**  
**Aspen**  
Environmental Group



View upstream on Nestor Channel near Nestor Way: note heavy infestation by exotic plants, residential encroachment on southwest side, and potential for terrace and transitional zone restoration on northeast side.



View downstream on Nestor Channel toward Coronado Boulevard: note presence of exotic plants, rock riprap, residential encroachment on southwest side, and potential for terrace and transitional zone restoration on northeast side.



View upstream on Nestor Channel toward Coronado Boulevard: note urban encroachment on east side and potential for terrace and transitional zone restoration on west side.



View downstream on Nestor Channel toward Dahlia Avenue: note urban encroachment on both sides, recent clearing of channel vegetation, and enhancement potential through debris and exotic plant removal and limitations on in-channel clearing.

## Otay River Watershed Management Plan

### Figure 23 Enhancement and Restoration Options for Nestor Channel

**Aspen**  
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View downstream at Palm Avenue Tributaries: note exotic vegetation within and adjacent to the main channel and the nursery and Hanson Spancrete operations in the distance; the exotic plants could be removed, the detention basin could be removed, the channel could be reconnected downstream to the Otay River, and targeted planting of native species could occur.



View downstream toward tributary to main channel detention basin: note wetland vegetation in the detention basin is sustained by the artificial impoundment of surface waters.



View at wetland habitat in the detention basin looking back upstream toward Palm Avenue: note the dominance of bulrush and the difference in elevation between this area and the roadway.

## Otay River Watershed Management Plan

### Figure 24 Restoration Options for the Palm Avenue Tributaries

**Aspen**  
Environmental Group



View upstream at Cedar Creek: note low-flow crossing, pedestrian bridge, rock riprap and other floodplain fills including RV pads; restoration options could include removing the fills and the creek-adjacent pads, regrading a more natural channel planform, targeted native plantings, and follow-up removal of exotic vegetation (the low-flow channel and pedestrian bridge appear to be less of a concern at this time).



View upstream and at northern floodplain of Dulzura Creek from Pio Pico culverted crossing: note storage/parking yard in the floodplain, fills along the creek, and watermarks and deposition on and past the fence; restoration could include relocating structures out of the floodplain, replacing the culverted crossing with a span bridge, removing fills and regrading to a more natural planform, spot planting native species, and follow-up exotic species removal.



View downstream and at northern floodplain of Dulzura Creek from Pio Pico culverted crossing: note extent of water flow onto the floodplain; similar restoration options as previously described, but also remove two unsecured culverts downstream (removal of northern floodplain structures such as the kiosk appears to be less of a concern at this time).



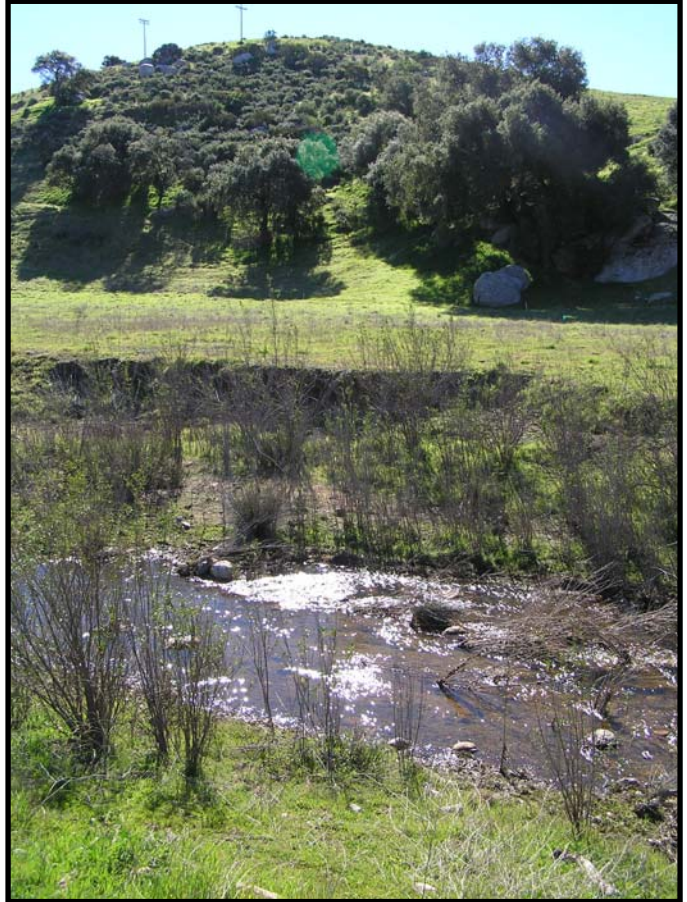
View westward from Otay Lakes Road: note heavy flooding of the road, which slows access and can damage vehicles, and fills along the creek on both sides of the road; a bridge could be constructed at this location to ensure uninterrupted access through this area.

## Otay River Watershed Management Plan

Figure 25  
**Restoration Options for  
Cedar Creek and Dulzura Creek  
in the Pio Pico Campground  
Aspen**  
Environmental Group



View of Dulzura Creek floodplain: note flood-water storage and scattered riparian vegetation on formerly grazed land; enhancement options include removal of exotic vegetation and selected planting of native vegetation.



View of Hollenbeck Canyon Creek upstream of State Route 94: note area of bank slumping supporting new growth of riparian scrub vegetation, the area was recently rangeland but is now managed as a preserve; restoration options include minor ripping/decompaction of the floodplain, regrading of the floodplain to a more stable planform, removal of exotic vegetation, and selected planting of native species.



View upstream along ephemeral tributary to Hollenbeck Canyon Creek: this area was recently rangeland but is now managed as a preserve; potential restoration options include minor ripping/decompaction of land around the stream, regrading of the stream to a more stable planform, exotic species removal, and selected planting of native species.

## Otay River Watershed Management Plan

Figure 26

### Enhancement and Restoration Options for Grazed Creeks

**Aspen**

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